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PHYSICS ABSTRACTS

BEING

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ABSTRACTS 2520–2688

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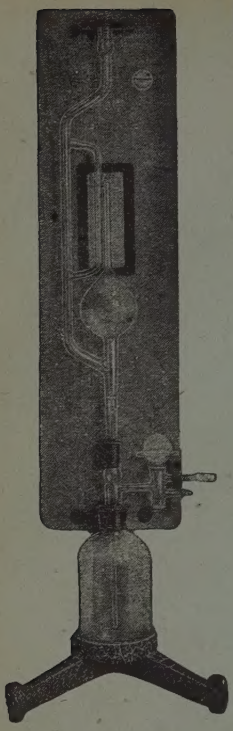

Bench type McLeod gauge

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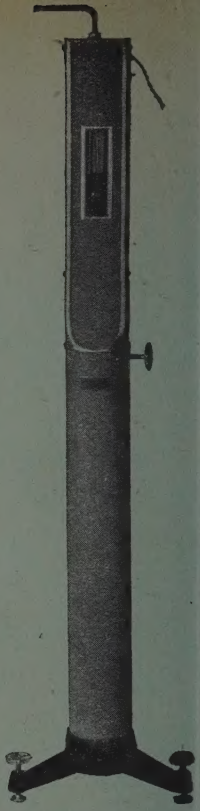

Enclosed type McLeod gauge

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Abstracts signed "E. R. A." are supplied by courtesy of the British Electrical and Allied Industries Research Association. Abstracts signed "M.-V." are supplied by courtesy of the Metropolitan-Vickers Electrical Co. Ltd.

511.28 2520

Highly abundant numbers. PILLAI, S. S. *Bull. Calcutta Math. Soc.*, 35, *pp.* 141–156, *Dec.*, 1943.—If the sum of the reciprocals of the rth powers of the divisors of a number N is greater than that for any smaller number, N is highly abundant and of order r. When $N = 2^{a_1} \cdot 3^{a_3} \ldots p^{a_p}$ and $r \geqslant 1$, it is shown that $a_2 \geqslant a_3 \geqslant \ldots \geqslant a_p$ and that $a_p = 1$ except in a few cases. It is also proved that, after a certain limit, no number can be simultaneously highly composite and highly abundant. In a large highly abundant number the indices near the beginning form a strictly decreasing sequence and groups of equal indices occur near the end. L. S. G.

511.5 : 513.623 2521

On ternary non-homogeneous cubic equations with more than one rational solution. SEGRE, B. *J. Lond. Math. Soc.*, 18, 2, *pp.* 88–100, 1943.—A geometric proof involving arithmetic properties of rational cubic surfaces recently investigated by the author [Abstr. 1926 (1944)] is given of the theorem that an equation of the type mentioned has an infinity of rational solutions. L. S. G.

512.31 : 517.531 *see Abstr.* 2530

512.831 : 531.134 *see Abstr.* 2544

512.894.2 2522

The minimum of a binary cubic form. DAVENPORT, H. *J. Lond. Math. Soc.*, 18, 3, *pp.* 168–176, 1943.—Simple purely arithmetic proofs are given of two recent theorems of Mordell [see Abstr. 769 (1944)]. Self-inverse linear transformations play an important part in the proofs. L. S. G.

513.612.1 2523

On algebraic correspondences. KNEEBONE, G. T. *J. Lond. Math. Soc.*, 18, 3, *pp.* 133–137, 1943.—A precise formulation of the theorem that any (m, n) algebraic correspondence between two lines, on which x and y are co-ordinates, is determined by an equation of degree m in x and n in y. The proof is purely algebraic and valid in any algebraically closed field of characteristic zero. L. S. G.

513.623 : 511.5 *see Abstr.* 2521

513.627.3 : 531.258 *see Abstr.* 2546

513.77 : 513.813 2524

On the isomorphic transformations of a space of K-spreads. DAVIES, E. T. *J. Lond. Math. Soc.*, 18, 2, *pp.* 100–107, 1943.—K-spreads are considered in a space of N dimensions having a co-ordinate system $x^i (i = 1, \ldots, N)$. On each K-spread ($K < N$) there is a system of parameters $u^\alpha (\alpha = 1, \ldots, K)$. Conditions satisfied by functions $\xi^i(x)$ are found such that the infinitesimal transformation $\bar{x}^i = x^i + \xi^i(x)dt$ shall determine the following transformation of the connection coefficients:

$$\bar{\Gamma}^i_{jK}(\bar{x}, \bar{p}) = \Gamma^i_{jK}(\bar{x}, \bar{p}) \quad \left(p^\beta_\alpha = \frac{\partial x^\beta}{\partial u^\alpha}\right)$$

The conditions of integrability of the resulting equations are found and it is shown that, if these and some additional conditions are finite in number and compatible, the space of K-spreads admits isomorphic transformations. L. S. G.

513.813 : 513.77 *see Abstr.* 2524

517.397.1 2525

A further inequality for Stieltjes integrals. YOUNG, L. C. *J. Lond. Math. Soc.*, 18, 2, *pp.* 78–82, 1943.—An inequality is obtained for the integral of $f(x)$ with respect to $g(x)$ which becomes of interest when $g(x)$ is made to satisfy a slightly weaker condition than that of bounded variation in the ordinary sense. L. S. G.

517.512 : 517.942.6 2526

A note on Sonine's polynomials. II. BASU, K. *Bull. Calcutta Math. Soc.*, 35, *pp.* 127–130, *Dec.*, 1943.—A continuation of a previous paper [Abstr. 2652 (1943)]. Some identities involving the polynomial $S \equiv S^n_\lambda(\lambda_1 r)$ are deduced and then, proceeding from the equation $rd^2S/dr^2 + (\lambda - \lambda_1 r)dS/dr + n\lambda_1 S = 0$ and the identity

$$\frac{\exp\left(-\frac{\lambda_1 rt}{1-t}\right)}{(1-t)^\lambda} = \sum_{n=0}^{\infty} \frac{t^n}{n!} \frac{\Gamma(\lambda+n)}{\Gamma(\lambda)} S^n_\lambda(\lambda_1 r)$$

some definite integrals are evaluated, e.g.

$$\int_0^\infty r^{\lambda-1} e^{-r} S^n_\lambda(r) S^n_\lambda(r) dr = \frac{n!\{\Gamma(\lambda)\}^2}{\Gamma(\lambda+n)}$$

A general type of integral evaluated is

$$\int_0^\infty z^p e^{-(\lambda_1+\lambda_2)z} S^n_\lambda(2\lambda_1 z) S^m_\mu(2\lambda_2 z) dz$$

where either $p + 1 > \lambda > \mu$ or $\lambda > p + 1 > \mu$ or $\lambda > \mu > p + 1$. L. S. G.

517.512.2 2527

Notes on Fourier series (II): On the Gibbs phenomenon. HARDY, G. H., AND ROGOSINSKI, W. W. *J. Lond. Math. Soc.*, 18, 2, *pp.* 83–87, 1943.—Let $\theta = \xi$ be a point of continuity or (finite) jump of a real, periodic and integrable function $f(\theta)$, and $C = \frac{1}{2}\{f(\xi - 0) + f(\xi + 0)\}$, $D = f(\xi + 0) - f(\xi - 0)$. Let $S_n(\theta)$ be the partial sum of the Fourier series of f. $G(\xi)$, the Gibbs set of f, for $\theta = \xi$, is the aggregate of the limits of $S_n(\theta)$ when $n \to \infty$ and $\theta \to \xi$ in any manner. When f is the function

$$\phi(\theta - \xi) = \frac{1}{\pi} \sum_1^\infty \frac{\sin n(\theta - \xi)}{n},$$

$G(\xi)$ is a closed interval about the origin, and this is true whenever

$$f(\theta) = g(\theta) + D\phi(\theta - \xi),$$

g being a function whose Fourier series is uniformly convergent near $\theta = \xi$. But $G(\xi)$ is not always symmetrical, and the main part of the paper is devoted to a proof of the theorem: there is a function $f(\theta)$, continuous except for a jump at ξ, whose Gibbs interval $G(\xi)$ is finite but not symmetrical about C. L. S. G.

517.512.2 2528

Note on the Riesz means of a Fourier series. KUTTNER, B. *J. Lond. Math. Soc.*, 18, 3, *pp.* 148–154, 1943.—It is easy to prove the theorem: if $f(x)$ is everywhere positive, and $k \geqslant 1$, then the Riesz means

(R, n, k) of the Fourier series of $f(x)$ are all everywhere positive. It is known that if $\lambda > 0$, then, for any given k, summability (R, n, k) is equivalent to summability (R, n^λ, k). However, the theorem is not true, for $\lambda \geqslant 2$, when Riesz means of type n^λ are considered, and the main part of the paper is the proof of the theorem: if $\lambda \geqslant 2$ then, however large k may be, the proposition "if $f(x)$ is everywhere positive the Riesz means (R, n^λ, k) of the Fourier series of $f(x)$ are all everywhere positive" is false. L. S. G.

517.512.2 : 517.521.8 2529

On the summability of Fourier series by Riesz's typical means. WANG, F. T. *J. Lond. Math. Soc.*, 18, 3, *pp.* 155–160, 1943.—Let $\phi(t)$ be even, integrable and of period 2π, and let the integral over a period be zero.

Let $$\phi(t) \sim \sum_{n=1}^{\infty} a_n \cos nt$$

and denote this Fourier series by S. A proof is given of the theorem:

If $$\phi_1(t) = \int_0^t \phi(t)dt = o[t/\log(1/t)]$$

as $t \to 0$, then S is summable $(\exp(\log n)^2, 1 + \delta)$ to sum 0 at $t = 0$, for any positive $\delta > 0$. L. S. G.

517.521.8 : 517.512.2 *see Abstr.* 2529

517.531 : 512.31 2530

A theorem on uniqueness. DOSS, S. H. *J. Lond. Math. Soc.*, 18, 3, *pp.* 137–140, 1943.—A proof is given of the truth of Whittaker's conjecture that, if the basic series associated with a given basic set of polynomials is effective in the circle $|z| < R$, the representation of a function (in this circle) by a uniformly convergent series of these polynomials is unique. L. S. G.

517.56 2531

A note on periodic functions and their derivatives. BELLMAN, R. *J. Lond. Math. Soc.*, 18, 3, *pp.* 140–142, 1943.—Let the real function $f(x)$ satisfy (1) $f(x) = f(x + 2\pi)$; (2) $f(x)$, $f_1(x), \ldots, f_{k+1}(x)$ all exist $[f_i(x)$ is the ith derivative of $f(x)]$ and $f_{k+1}(x)$ is the integral of a function belonging to $L^{2r}(0, 2\pi)$; (3) $\int_0^{2\pi} f(x)dx = 0$. A proof is given of the result

$$\int_0^{2\pi} \{f(x)\}^{2r}dx \leqslant a^{2r} \int_0^{2\pi} \{f_k(x)\}^{2r}dx$$

where $r = 1, 2, \ldots$ and

$$a_k = \frac{4}{\pi} \sum_{r=0}^{\infty} (-)^r/(2r + 1)^{k+1} \ (k \text{ even})$$

$$a_k = \frac{4}{\pi} \sum_{r=0}^{\infty} 1/(2r + 1)^{k+1} \ (k \text{ odd})$$

L. S. G.

517.63 2532

Note on an inversion formula for the Laplace transformation. ERDÉLYI, A. *J. Lond. Math. Soc.*, 18, 2, *pp.* 72–77, 1943.—A sequence $\{\lambda_m\} = \lambda_0, \lambda_1, \ldots$, of real or complex numbers is a base for the Laplace transform if any Laplace integral $g(s) = \int_0^{\infty} e^{-st} f(t)dt$ vanishing at all points $s = \lambda_m$, necessarily vanishes identically. Both $f(t)$ and $g(s)$ are determined uniquely by the values the latter function takes at the points $S = \lambda_m$. The expression of $g(s)$ and $f(t)$ in terms of $g(\lambda_m)$ yield, respectively, an interpolation formula and a new inversion formula for the Laplace transform. Such formulae are found in the present paper, the investigation being based upon an orthonormal set of functions which generalize the Jacobi polynomials. The new inversion formula, requiring the knowledge of $g(s)$ only at a certain denumerable set of points, is likely to be of value in cases where $g(s)$ is determined by numerical methods, e.g. in certain applications of the Heaviside calculus. [See Abstr. 18 (1944)]. L. S. G.

517.65 2533

A note on Hilbert transforms. KOBER, H. *J. Lond. Math. Soc.*, 18, 2, *pp.* 66–71, 1943.—Let

$$HF = \frac{1}{\pi} P \int_{-\infty}^{\infty} \frac{F(t)dt}{t - x} (-\infty < x < \infty)$$

and let K be the set of elements $F(t)$ such that both F and HF belong to $L(-\infty, \infty)$. The following theorem is proved: If $F(t) \epsilon L(-\infty, \infty)$, $0 < \lambda < 1$ and $\mu > (1 - \lambda)/2$ then

$$\left(\int_{-\infty}^{\infty} \frac{|HF|^\lambda dx}{(1 + x^2)^\mu} \right)^{1/\lambda} \leqslant A_{\lambda,\mu} \int_{-\infty}^{\infty} |F(t)|dt$$

where $A_{\lambda,\mu}$ depends on λ and μ only. When $\mu \leqslant (1 - \lambda)/2$ the left hand side need not be finite. Next, let k be the set of functions $f(e^{i\delta})$ such that both f and Hf belong to $L(-\pi, \pi)$ where

$$Hf = \frac{1}{2\pi} P \int_{-\pi}^{\pi} f(e^{i\delta}) \cot \tfrac{1}{2}(\phi - \delta)d\delta \ (-\pi < \phi < \pi)$$

A proof is given of the theorem: a function $F(t)$ belongs to K if and only if the function

$$f(e^{i\delta}) = (1 + e^{i\delta})^{-2} F(\tan \tfrac{1}{2}\delta)$$

belongs to k and its Fourier coefficient C_{-1} is zero. Some applications of these theorems are made, particularly to Fourier transforms. [See Abstr. 998 (1944)]. L. S. G.

517.7 2534

Note on the evaluation of an elliptic integral of the third kind. DEAN, W. R. *J. Lond. Math. Soc.*, 18, 3, *pp.* 130–132, 1943.—An elementary method is used to obtain the known expression for $\int_0^{\pi/2} d\phi/(1 - \nu \sin^2 \phi)(1 - k^2 \sin^2 \phi)^{\frac{1}{2}}$ in terms of elliptic integrals of the first and second kinds. L. S. G.

517.942.6 : 517.512 *see Abstr.* 2526

517.948.34 : 621.396.67 2535

The antenna problem. BRILLOUIN, L. *Quart. Appl. Math.*, 1, *pp.* 201–214, *Oct.*, 1943.—[Abstr. 2149 B (1944)].

518.4 : 621.396.671 2536

A chart for rhombic antenna design. BAKER, W. G. *A.W.A. Techn. Rev.* [*Amal. Wireless Aust.*], 6, 4, *pp.* 177–192, 1944.—[Abstr. 2150 B (1944)].

518.5 : 621.3.012.1 2537

A vector calculating device. SNOWDON, C. *Electronic Engng*, 17, *pp.* 146–148, *Sept.*, 1944.—[Abstr. 2059 B (1944)].

19.251 : 530.145 : 620.113 2538

Tolerances and their effect on physical measurements. DARWIN, C. *Trans. Illum. Engng Soc., Lond.*, 9, *pp.* 119–125, *July*, 1944.—[Abstr. 1770 (1944)].

23.745 : 550.385 *see Abstr.* 2650

23.746 2539

Final relative sunspot-numbers for 1943. BRUNNER, W. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 107–108, *June*, 1944.

23.746 2540

Provisional sunspot-numbers for January to March, 1944. BRUNNER, W. *Terr. Magn. Atmos. Elect.*, 9, *p.* 129, *June*, 1944.

23.877 : 536.2 *see Abstr.* 2593

25.24 2541

The shielding effect of planetary magnetic fields. MCCONNELL, J., AND SCHRÖDINGER, E. *Proc. Roy. Irish Acad.*, 49*A*, *pp.* 259–273, *March*, 1944.—The insertion in the Maxwell equations of a "cosmical term" μ which is not vanishingly small affects the magnetic field surrounding a planet such as the Earth as computed from the observed surface values. Using $\mu^{-1} = 30\,000$ km. [Abstr. 1463 (1944)] the shielding effect is computed by the Störmer theory for the Earth, and the inverse effect deduced for escape from the Sun. The effect on terrestrial cosmic rays is negligible, but the trajectories of auroral particles will be profoundly affected by the precise value of μ assumed. The min. momentum for escape from the Sun is considerably lowered, and theories of the aurora are again affected. A. HU.

53 : 549.211 *see Abstr.* 2645

53 : 679.5 2542

Physical properties of alkylated phenols. PARDEE, W. A., AND WEINRICH, W. *Industr. Engng Chem.*, 36, *pp.* 595–603, *July*, 1944.—Experimental data on v.p., viscosity, m.p. and sp. gr. are reported.

530.12 : 531.51 : 537.1 2543

Union of the three fundamental fields (gravitation, meson, electromagnetism). SCHRÖDINGER, E. *Proc. Roy. Irish Acad.*, 49*A*, *pp.* 275–287, *March*, 1944.—A generalization of the theory formerly put forward [Abstr. 2514 (1943)] has been made by dropping the symmetry condition, thus making the affine connection non-symmetric. This gives rise to a further tensor of equal standing with the two tensors combined in the Einstein tensor. It is a skew-symmetric six-vector. An intermediate case is studied, known as the weakly asymmetric case, where there is almost full symmetry. The field equations of this weakly asymmetric affinity are considered and discussed. This six-vector field can only be assigned the rôle of the Maxwell field, and cannot be interpreted as the meson field. There is a mutual interlocking between the two six-vector fields, but the nature of it is not determined. The geodesics depend only on the symmetrical constituent of the affine connection, but this is not uniquely defined by the field of geodesics. The electromagnetic field has no direct influence on the geodesics, whilst the meson field has. In an appendix the geodesics of an affine connection are more fully considered. A. J. M.

530.145 : 620.113 : 519.251 *see Abstr.* 2538

531.134 : 512.831 2544

A matrix theory of screws in hyperspace. GHOSH, N. N. *Bull. Calcutta Math. Soc.*, 35, *pp.* 115–126, *Dec.*, 1943.—A system of forces acting on a rigid body in a Euclidean n-space may be represented by the skew-symmetric matrix $\mathbf{P} + \mathbf{\Omega}$ (1), where $\mathbf{P} = \sum_{s=2}^{n+1} p_{s-1}(e_{s1} - e_{1s})$, $\mathbf{\Omega} = \sum_{s,t=2}^{n-1} \omega_{s-1,\,t-1}(e_{st} - e_{ts})$ $(t > s)$. Here $\mathbf{P}$ corresponds to the resultant force acting at the origin and $\mathbf{\Omega}$ to the resultant couple. The e's denote matrix units. Also the velocity $\dot{x}$ at a point $\mathbf{X}$ at time t is expressible as $\dot{\mathbf{X}} = \dot{\mathbf{H}} + \mathbf{\Omega X} - \mathbf{X\Omega}$ (2), where $\dot{\mathbf{H}}$ corresponds to the velocity of translation and $\mathbf{\Omega X} - \mathbf{X\Omega}$ to rotation about the origin. The canonical forms to which (1) and (2) can be reduced are studied, and there is a distinction according as n is odd or even. A generalization is given of Ball's virtual coefficient, of a pair of screws. L. S. G.

531.224 2545

Note on the uniqueness of solution of problems of thin plates bent by normal pressures. SEN, B. *Bull. Calcutta Math. Soc.*, 35, *pp.* 135–141, *Dec.*, 1943.—If the plate is bounded by a continuous closed curve the results are: (1) (clamped or supported edge) there is only 1 value of the normal displacement ω expressed as a single-valued continuous function with continuous derivatives up to the 4th order, which satisfies the equilibrium equation and the boundary condition; (2) (free edge) 2 values of ω are possible and their difference may be a linear function of the co-ordinates, representing a rigid-body displacement. [See Abstr. 1331 (1943)]. L. S. G.

531.258 : 513.627.3 2546

Theory of membranes in shape of developable surfaces. BESKIN, L. *J. Appl. Phys.*, 15, *pp.* 547–561, *July*, 1944.—The geometry of developable surfaces is discussed and the general equations of equilibrium of membranes are applied to such surfaces (excluding cones and cylinders). The theory neglects local bending in the thickness of the membrane. Some practical applications to aircraft structures (e.g. wings or fuselages) are made and graphical methods of analysis are discussed. L. S. G.

531.51 : 537.1 : 530.12 *see Abstr.* 2543

531.715.1 2547

Comparison of the prototype metre with the wavelength of the red line of cadmium. ROMANOVA, M. F., WAHRLICH, G. V., KARTASHEV, A. I., AND BATARCHUKOVA, N. R. *C.R. Acad. Sci. URSS*, 37, 2, *pp.* 46–51, 1942.—Values previously obtained for the wavelength of the red line of Cd are set out, in their original form and corrected to apply to dry air at 15°C. and 760 mm. Hg, containing 0·03% CO_2. Technique and results obtained in a new comparison between the std. USSR metre (metre No. 28) and the wavelength of this line are described in detail. The method employed involves the use of a Fabry and Perot interferometer, measurements being made on a flat-ended steel metre bar. Mean values obtained for the red line of Cd were: normal air, $\lambda = 6\,438{\cdot}4687$ Å; vacuum, $\lambda = 6\,440{\cdot}2488$ Å. The mean quadratic error was $\pm$ 0·0002 Å. A. E. T.

531.74 2548

An apparatus for measuring the torsion angle in long bones. KRAHL, V. E. *Science*, 99, *p.* 498, *June* 16, 1944.

531.767 2549

New speed-recorder for vehicles. JERRETT, R. S., AND THOMAS, F. G. *J. Sci. Instrum.*, 21, *pp.* 119–120, *July*, 1944.—The recorder is portable and is energized from a 12 V car battery. Pairs of interlocking relays are remotely controlled by trips operated by the vehicles. The first trip starts the pen recorder and the second stops it, the length of the line on the drum being ∝ the time interval between the two trips. The scale of the paper is chosen so that the speed can be read directly in m.p.h. The distance between the trips may be 120 yd. for a range of speeds from 25 to 80 m.p.h. For speeds up to 40 m.p.h. the distance is halved. Circuit diagrams are given, with an account of functional details. A. W.

531.786 : 621.317.78 2550

Dynamometers. MARTIN, H. M. *Gen. Elect. Rev.*, 47, *pp.* 29–34, *July*, *and pp.* 45–52, *Aug.*, 1944.—[Abstr. 2110 B (1944)].

531.788 : 615.37 2551

A pressure-operated safety circuit for use in high-vacuum serum-drying plants. BYROM, F. B. *J. Hyg.*, 43, *pp.* 349–351, *April*, 1944.—A form of Pirani vacuum gauge is described which obtains a continuous record of the total residual pressure in a high-vacuum serum-drying cylinder of the Greaves–Adair type. The circuit incorporates an automatic relay which breaks the electric current heating the frozen serum if the pressure rises to a dangerous level, and so delays the onset of fusion of the serum. C. J. G.

532.13 : 676.1 2552

Relationship between cellulose viscosities measured by the *TAPPI* standard and the cupriethylene diamine methods. COREY, A. J. *Paper Tr. J.*, 118, *TAPPI Sect.*, *pp.* 167–168, 1944.—These methods are compared for 1% solutions of 11 bleached sulphite wood pulps. The variations between individual tests on the same pulp were 5–15 and approx. 2%, respectively. An interconversion graph is given. A standard reference oil (viscosity 200 cp. at 25°) is preferred to glycerin for calibration. Pulps of very high or very low viscosity should be evaluated as 0·50 and 0·75% solutions, and the value for a 1% solution calculated. Rapid dissolution in the cupriethylenediamine solvent is ensured by disintegrating the pulp in water and reforming it, in a Buchner funnel, into a bulky pad which is dried and torn up. J. G.

532.21 : 621.316.76.077.6 2553

Photo-electric automatic liquid-level control. CEAGLSKE, N. H., AND KESSLINGER, S. A. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 393–394, *June*, 1944.—[Abstr. 2095 B (1944)].

532.54 : 532.685 2554

Pressure and streamline distribution in waterlogged land overlying an impervious layer. KIRKHAM, D. *Soil Sci. Soc. Amer. Proc.*, 5, *pp.* 65–68, 1940.—Photographs of flow lines of coloured water flowing in a model tank containing sand and having horizontal drain tubes arranged, in various experiments, at different heights above the tank bottom, show that water can flow "uphill" into the bottom of the drains. Measurements of discharge show that more water is drained away when the drains are located at some distance above the impervious bottom of the tank. An analytical solution of the problem of land drainage by means of drains, based on Darcy's law, is given; results derived theoretically show satisfactory agreement with the stream-line flows photographed.

J. S. G. T.

532.61 : 532.7 255

Surface tension and van der Waals' equation. AULUCK, F. C., AND RAI, R. N. *J. Chem. Phys.*, 12, *pp.* 321–322, *July*, 1944.—It is shown that the hole theory of the liquid state proposed by Fürth [Abstr. 2369 (1941)] leads to a connection between a, the mol. force term in van der Waals' equation, and the surface tension σ. The relationship derived from Fürth's theory is $a_1 = 1{\cdot}3\,V^2[\sigma^3/(kT)^4]$ and analysis shows that a is proportional to a_1, but that the const. of proportionality is 2 instead of 1. The present authors have solved the Schrödinger equation for a hole in a liquid and determined the eigenvalues of its energy. This treatment gives a second expression for the van der Waals' force, $a_2 = 3{\cdot}5\sigma V^2(7\pi\sigma/15E)^{\frac{1}{3}}$ and in this instance the const. of proportionality is 0·6.

R. W. P.

532.61.08 : 532.691 : 532.739.2 255

Sodium alcohol sulphates. Properties involving surface activity. DREGER, E. E., KEIM, G. I., MILES, G. D., SHEDLOVSKY, L., AND ROSS, J. *Industr. Engng Chem.*, 36, *pp.* 610–617, *July*, 1944.—The preparation and properties are described for alternate members of a homologous and of an isomeric series of purified Na salts of secondary alcohol sulphates containing from 11 to 19 C atoms, and for a straight hydrocarbon chain with the sulphate group in various positions. The purified Na salts of the primary alcohol sulphates with 10, 12, 14 and 16 C atoms are also examined. Measurements were made of the surface tension and foaming, wetting and detersive properties of solutions of these compounds in water and with added electrolytes. Solubilities of Na salts of the secondary and primary alcohol sulphates studied are reported at 5 deg. intervals from 20 to 40°C. The data are discussed from the point of view of correlating changes in the properties involving surface activity when the structure and mol. wt. of the compound are changed.

532.685 : 532.54 *see Abstr.* 2554

532.69 : 621.357.7 255

Wetting agents—their use in electroplating and allied processes. SILMAN, H. *J. Electrodepos. Techn. Soc.*, 19, *pp.* 131–146, 1944.—[Abstr. 2125 B (1944)].

532.691 : 532.739.2 : 532.61.08 *see Abstr.* 2556

532.7 : 532.61 *see Abstr.* 2555

532.71 255

An apparatus for low-temperature dialysis. FALCONER, J. S., AND TAYLOR, D. B. *Nature, Lond.*, 154, *pp.* 87–88, *July* 15, 1944.—Both speed and low temperatures are highly desirable in the dialysis of sensitive protein solutions. For securing these conditions a study has been made of a dialysis sac containing a salt solution which is suspended in water. The greater density of the solution dialysing ou

auses it to flow downwards, and currents can be seen reaming away from the bottom of the sac; a dialyser described whereby a circulation is set up which esults in a const. supply of fresh water to the outside f the dialysis sac. The flow of fluid inside and utside the membrane helps to abolish skin effects hich restrict diffusion due to stagnant surface layers. he dialysis time for a 0·5 saturated $(NH_4)_2SO_4$ olution is about 30 hr. with this apparatus, and the nal conc. inside the sac is approx. 1/500 of the nitial conc. The term "gravity dialyser" is sug- ested for the apparatus. H. H. HO.

532.739.2 : 532.691 : 532.61.08 *see Abstr.* 2556

533.17 2559

On the flow of gas through a nozzle with velocities exceeding the speed of sound. FOX, L., AND SOUTHWELL, R. V. *Proc. Roy. Soc. A*, 183, *pp.* 38–54, *Aug.*, 1944.—An iterative method [Abstr. 1737 (1944)] s applied to determine the ultrasonic régime for gas lowing irrotationally through a convergent-divergent ozzle, i.e. that (unique) régime in which the pressure nd density of the gas decrease continuously in its assage from end to end. Reynolds's approx. treat- ent of the problem assumed the velocity to be dis- tributed uniformly over each cross-section, and in consequence found a unique value for the limiting mass flow, whether the velocity be subsonic or ultra- sonic downstream of the "throat" (upstream it is always subsonic). A more exact treatment shows that the ultrasonic value is 0·045% greater than the subsonic value, which Reynolds's theory over- estimates by 0·083%. The two régimes imply 2 different values of the pressure at exit, and for inter- mediate pressures there is no solution of the problem. Even in the subsonic régime (when the mass flow is critical), velocities exceeding the local speeds of sound are attained in regions adjoining the nozzle walls near the throat.

533.275 : 631.812 : 621.317.39 2560

Determining hygroscopicity of fertilizers. YEE, J. Y. *Industr. Engng Chem.* (*Analyt. Edit.*), 16, *pp.* 367–369, *June*, 1944.—[Abstr. 2103 B (1944)].

533.6.011.31 : 621.515 2561

Investigation of blade characteristics. Performance and efficiency of turbine and axial-flow compressor stages. WESKE, J. R. *Trans. Amer. Soc. Mech. Engrs*, 66, *pp.* 413–420, *July*, 1944.—[Abstr. 2159 B (1944)].

533.7 : 536.423.4 2562

The mechanics of the condensation of gases. KAPLAN, W., AND DRESDEN, M. *Phys. Rev.*, 66, *pp.* 16–20, *July* 1 *and* 15, 1944.—The phenomenon of condensation is explained on the basis of the classical mechanical model of a gas. The condensation is connected with a change in the topological structure of the energy surface in the $6N$-dimensional phase space. This occurs when the total energy is zero. Agreement with experiment is satisfactory.

534.22 : 551.46.018.1 *see Abstr.* 2656

534.835 2563

Noise in industry. WYDER, C. G. *Factory Mgmt. Mainten., pp.* 138–156, *May*, 1944.—Discusses reasons why noise should be eliminated in industrial plant. Methods of reducing and controlling noise at its source are dealt with, and attention is paid to vibration insulation. Noise control by isolation enclosures and acoustical treatment methods are considered. M.-V.

534.862.3 : 621.395.625.3 2564

Magnetic recording. ASHMAN, G. L. *Wireless World*, 50, *pp.* 226–228, *Aug.*, 1944.—[Abstr. 2143 B (1944)].

535.215 : 537.312.5 : 549.211 2565

The photoconductivity of diamond. I. Experimental results. II. Theoretical considerations. PANT, D. D. *Proc. Indian Acad. Sci. A*, 19, *pp.* 315–333, *May*, 1944.—The photoconductivity of 36 diamonds, mostly polished cleavage plates, were measured with Hg illumination $\parallel$ and $\perp$ the polished plane faces. No clear cut division into diamonds of high and low conductivity [Abstr. 2291 (1934)] is possible. Diamonds, highly photoconducting in the ultra-violet, exhibit similar properties in the visible. Strongly photoconducting diamonds exhibit the red-light effect, but this is not observed with lower photoconductivities. Such diamonds also exhibit a second current on long illumination which persists after the light is extinguished. Illumination with red light increases the current when the diamond is in this state, the increase being quantitatively related to the magnitude of the secondary current without illumination. The relations between photoconductivity and other optical properties are discussed. II. Variations in photoconductivity in diamonds are due to variations in crystal structure, assuming that non-homogeneities and irregularities in the crystal produce the photoelectrically active centres. Other features of photoconductivity, the spectral distribution curves (particularly the rise for $\lambda\lambda < 3\,000$ Å), the absence of a definite threshold frequency, the effect of red light, and the secondary current, are explained. The relation between the magnitude of the dark secondary current and that produced by red light excitation is derived theoretically. W. R. A.

535.215 : 537.525.8 2566

Light-effect in chlorine under electrical discharge: change of the wave form due to irradiation. JOSHI, S. S. *Nature, Lond.*, 153, *p.* 147, *July* 29, 1944.—[See Abstr. 1786, 2049 (1944)]. Changes in the current-structure and its time-delineation are revealed by a C.R.O. The oscillograph shows that a large number of higher frequencies of widely varying strengths exist, which were not transients but repeatable and characteristic constituents of the discharge current. The production of a change under electrical discharge, chemical or otherwise (H_2-Cl_2 reaction) requires a min. threshold potential V_m characteristic of the reaction. In elementary gases, V_m may be identified with or related simply to the corresponding Paschen potential. Below V_m, the oscillograph showed a markedly simple current-structure; further, changes of the amplitudes due to the light-effect were not detected. It is considered that ionization by collision in fields due to the applied potential is a necessary condition for the occurrence of this phenomenon. It is found that, both for the light-effect and the above type of reactions, V_m diminishes as the frequency is increased. H. H. HO.

535.234 2567

Colours of total radiators expressed on the C.I.E. trichromatic system for the temperature range 1 500–10–9 000°K. ($C_2 = 14\,384{\cdot}8$). HARDING, H. G. W. *Proc. Phys. Soc., Lond.*, 56, *pp.* 305–328, *Sept.*, 1944.—Tables of the colours of Planckian (total or black-body) radiators expressed on the C.I.E. Trichromatic System (1931) are given for the temperature range 1 500–10–9 000°K., also for 9 500–500–11 000°K., 13 333⅓°K., 20 000°K., 40 000°K., and infinite temperature. The colours refer to energy distributions calculated from Planck's formula with a value 14 384·8 for the const. C_2. Additional tables are included to facilitate the calculation of the colours if other values of C_2 are used in Planck's formula. The colour differences are given for a change of the const. from 14 384·8 to 14 350 and from 14 384·8 to 14 320.

535.247.4 : 621.317.727 = 3 2568

Compensation method for photo-electric photometry. WEISGLASS, G. *Schweiz. Arch. angew. Wiss. Techn.*, 10, *pp.* 137–148, *May*, 1944.—[Abstr. 2107 B (1944)].

535.312 : 549.211 : 537.531 *see Abstr.* 2605

535.317 : 535.8 2569

New catadioptric systems. MAKSUTOV, D. D. *C.R. Acad. Sci. URSS*, 37, 4, *pp.* 127–131, 1942.—The systems described are highly achromatic and aplanatic meniscus-lens–spherical-mirror combinations. The achromatic meniscus is a single lens of any sort of glass, the radii of curvature and thickness being chosen to reduce the secondary spectrum 500 to 1 000 times as compared with an equivalent achromatic lens. The meniscus also introduces substantial positive spherical aberration, which compensates for the negative aberration of the mirrors. The fundamental system is a meniscus–concave-mirror combination, and this is analysed. It is shown how the various classical systems for telescopes can be transformed into meniscus systems, and the possibilities offered by the latter in other branches of optical engineering are indicated. [See Abstr. 2413 (1944)].

A. E. T.

535.317.7 2570

The measurement of aberrations. *Proc. Phys. Soc., Lond.*, 56, *pp.* 277–290, *July*, 1944.—A discussion held by the Optical Group.

535.33 : 536.631 : 549.211 2571

The lattice spectrum and specific heat of diamond. DAYAL, B. *Proc. Indian Acad. Sci. A*, 19, *pp.* 224–230, *May*, 1944.—The bulk modulus of diamond, calculated from the spectroscopic data [Abstr. 2580 (1944)] by the method of Nath [Abstr. 3257 (1935)] is $5{\cdot}9 \times 10^{12}$ in agreement with experimental values. Values of C_v have been calculated from spectroscopic data, the 3 deg. of freedom not covered by these data being considered as an elastic spectrum and represented by a term of the Debye type having a characteristic temp. of 820°. Observed and calculated values agree, particularly in the range 200–1 100°K. W. R. A.

535.338 : 536.461 2572

Continuous spectra in flames: the rôle of atomic oxygen in combustion. GAYDON, A. G. *Proc. Roy. Soc. A*, 183, *pp.* 111–124, *Aug.*, 1944.—The causes and types of continuous spectra emitted by flames are discussed. The yellow-green continuous spectrum emitted by some flames containing oxides of N is probably identical with the spectrum of the air afterglow and is therefore due to a reaction between NO and O. It thus becomes possible to test for the presence of atomic O in a flame by admitting NO and observing if a yellow-green emission results. For the CO flame there appears to be a high conc. of atomic O, both for the dry and moist flame. The combustion mechanism is discussed in detail using this knowledge. For the H flame, a little atomic O is present, but results do not permit of definite conclusions. For hydrocarbon flames, there is no sign of atomic O in the inner cone, and this is taken as strong evidence in favour of a peroxidation rather than a hydroxylation mechanism.

535.343-1 2573

The effects of various ions on the infra-red absorption of water. WILLIAMS, D., AND MILLETT, W. *Phys. Rev.*, 66, *pp.* 6–8, *July* 1 *and* 15, 1944.—Variations in the positions of the absorption max. at $1{\cdot}46\,\mu$, $1{\cdot}79\,\mu$, $1{\cdot}96\,\mu$, $310\,\mu$, $4{\cdot}7\,\mu$ and $6{\cdot}1\,\mu$ were observed. The changes produced by the solutes are compared with data on the effects of temperature variation. Large ions produce changes similar to the changes produced by increasing the temperature of the pure solvent, small ions produce the reverse effect.

535.343.2 : 535.372 : 549.211 2574

The fluorescence and absorption spectra of diamond in the visible. MANI, A. *Proc. Indian Acad. Sci. A*, 19, *pp.* 231–252, *May*, 1944.—Fluorescence and luminescence spectra in the visible were investigated at room and liquid-air temp. for 32 diamonds of widely varying luminescence, colour and intensity. The spectra are related with respect to their general character and their intensities. All the spectra consist mainly of the electronic bands at 4 152 and 5 032 Å, which comprise a set of lines, bright in fluorescence, dark in absorption, and lattice lines, appearing at greater λ in fluorescence. With blue fluorescence, the 4 152 system is the more prominent, and with yellow fluorescence, the 5 032 system; but the systems appear with comparable intensities. Thirty-six electronic lines, other than 4 152 and 5 032 Å, are recorded. The 4 152 Å line appears in most diamonds as a doublet, the width and separation of the 2 lines increasing with intensity of blue fluorescence. The 5 032 Å line shows no such changes. Differences in ν between the main lines at 4 152 and 5 032 Å and the associated lattice lines lie in the infra-red and represent the vibration $\nu\nu$ of the diamond lattice. $\Delta\nu$ are the same in both systems, but the sharpness and intensity distribution vary. Twenty-five ν are derived, constituting the lattice spectrum of diamond. W. R. A.

535.343.2-31 : 549.211 2575

The ultra-violet absorption spectrum of diamond. BAI, K. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 253–260, *May*, 1944.—The region 3 300–2 200 Å was investigated. With non-fluorescent and yellow-green fluorescent diamonds, the recorded spectra extend to 2 250 Å, requiring long exposure with yellow-green fluorescent specimens. Weakly blue fluorescent

diamonds show a cut-off at 3 050 Å, preceded by 3 sharp and intense bands at 3 060, 3 075 and 3 157 Å. In strongly blue fluorescent diamonds these bands disappear, and the region of transmission extends to 2 450 Å, with step-like falls in intensity at 2 845, 2 715 and 2 570 Å. Diamonds exhibiting both types of fluorescence give absorption lines at 2 359 and 2 356·5 Å, with 5 bands at greater and 3 at shorter λ. Intensity of fluorescence varies with the intensity and breadth of these absorption lines and bands, which sharpen and shift towards shorter λ at liquid-air temp. W. R. A.

535.345-31 : 549.211 2576

Ultra-violet transparency patterns in diamond. RENDALL, G. R. *Proc. Indian Acad. Sci. A*, 19, *pp.* 293–297, *May*, 1944.—The ultra-violet transparency of crystals and cleavage plates of diamonds was examined by passing 2 536 Å Hg radiation through the specimen and producing an image on a screen of U glass. A wide range of behaviour, from complete opacity to complete transparency, related to the luminescence properties of the individual diamond, was observed. Transparency patterns of cleavage plates are in some cases similar to the luminescence patterns, but reversed; in other cases such a resemblance is not observed. The origin of these differences and similarities is discussed with ref. to the intrusion of one diamond structure into another. W. R. A.

535.371 : 544.65 2577

Fluorescence reactions with boric acid and *O*-hydroxy-carbonyl compounds, and their application in analytical chemistry. III. Effect of bromination of the *O*-hydroxy-carbonyl molecule on the appearance of fluorescence effects with boric acid. NEELAKANTAM, K., AND VENKATESWARLU, V. *Proc. Indian Acad. Sci. A*, 19, *pp.* 401–404, *June*, 1944.—Introduction of Br atoms into an *O*-hydroxy-carbinol compound causes usually, but not always, absence of fluorescence effects on addition of boric acid. [See Abstr. 2009 (1944)]. W. R. A.

535.371 : 535.515 : 549.211 2578

The nature and origin of the luminescence of the diamond. RAMAN, C. V. *Proc. Indian Acad. Sci. A*, 19, *pp.* 199–215, *May*, 1944.—The luminescence of several specimens of Indian and S. African diamonds, both natural crystals and cleavage plates, was studied. Many cleavage plates show luminescence patterns which, together with the transparency patterns in the ultra-violet at $\lambda < 3\,000$ Å and the patterns of structural birefringence between crossed polaroids, are due to the lamellar twinning of the various crystal structures of diamond [Abstr. 2637 (1944)]. Interpenetration of the pos. and neg. tetrahedral forms results in a blue luminescence without structural birefringence and opacity to ultra-violet radiation. Interpenetration of tetrahedral and octohedral structures gives rise to a yellow luminescence, a banded structural birefringence, and imperfect ultra-violet transparency. Interpenetration of the two octohedral forms gives no luminescence, but produces ultra-violet transparency and a characteristic finely-streaked birefringence. The emission and absorption spectra in the visible region, and the reflecting power of the lattice planes for X-rays confirm the physical nature of the luminescence. W. R. A.

535.371 : 549.211 2579

Luminescence patterns in diamond. BAI, K. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 274–279, *May*, 1944.—Lines in the patterns of intensity and colour in the luminescence of cleavage plates of diamond, produced by long-wave ultra-violet illumination, frequently run parallel to the natural faces of the crystal. Blue luminescent diamonds may show no pattern, whereas patterns are always observed with mixed blue and yellow luminescence. Yellow luminescence is characterized by several bright parallel lines, sometimes in more than one direction. Local variations in the ultra-violet absorption spectrum show that the patterns arise from the intrusion of a diamond structure having properties different to those of the rest of the crystal. W. R. A.

535.372 : 549.211 : 535.343.2 *see Abstr.* 2574

535.375 : 539.31 : 548.0 *see Abstr.* 2636

535.375.5 : 549.211 2580

The Raman spectrum of diamond. KRISHNAN, K. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 216–223, *May*, 1944.—The Raman spectrum of the ultra-violet transparent type of diamond was investigated using the 2 536 Å Hg resonance line. In addition to the displacement of 1 332 cm.$^{-1}$, displacements of 1 925, 2 176, 2 245, 2 267, 2 301, 2 467, 2 495, 2 518, 2 610 and 2 665 cm.$^{-1}$ are recorded. These are identified as the harmonics and combinations of the 8 fundamental oscillation frequencies of the diamond according to the Raman theory of crystal dynamics. [Abstr. 1877 (1944)]. W. R. A.

535.391 2581

Surface treatment of glass to reduce its reflecting power. LEE, H. W., AND NEUMANN, E. A. *Photogr. J.*, 84, *pp.* 223–229, *July*, 1944.—A survey article which deals at length with the theory of suppression of reflection from polished glass surfaces and discusses various methods (chemical, dipping, evaporation) of treating surfaces to achieve this result. The relative merits of the various processes are discussed and the advantages gained outlined. A. H.

535.393 : 537.29 *see Abstr.* 2600

535.434 : 537.29 2582

Effect of electric field on Tyndall scattering. SUBRAHMANYA, R. S., DOSS, K. S. G., AND RAO, B. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 405–413, *June*, 1944.—The effect of an electric field on sols of AgI, stearic acid(1) and benzopurpurine 6B(2) was investigated. The equivalent spherical dia. of AgI and I are 104·8 and 390·8 mμ. By combination of the Schlierung and Langmuir methods, the shapes of the particles were found to be: AgI not appreciably anisometric; (1) disc-shaped; (2) rod-shaped. The electric field was applied by Pt or C sheet electrodes, the sol being illuminated so that the light was incident on the sol horizontally and the scattered light was viewed transversely in the horizontal and vertical directions. The field could be applied longitudinally parallel to the beam, or transversely in the vertical or horizontal directions. The field strengths were $\sim$ 100 V/cm. d.c. or 220 V/cm. a.c. and both gave identical results with (1) and (2). AgI showed no effects. For large disc- or rod-shaped particles oriented by a linear field, there is enhanced scattering

when the field is put on, if the plane of incidence and observation is ⊥ the field, but diminished scattering for other orientations. W. R. A.

535.434 : 541.182.6.046.7 *see Abstr.* 2630

535.515 : 549.211 2583

Birefringence patterns in diamond. RAMAN, C. V., AND RENDALL, G. R. *Proc. Indian Acad. Sci. A*, 19, *pp.* 265–273, *May*, 1944.—The structural or geometric birefringence results from the co-existence in the crystal of structures with different properties and crystal spacings. Diamonds of the blue luminescent, ultra-violet opaque type are isotropic, whereas those of the non-luminescent, ultra-violet transparent type exhibit birefringence. X-ray studies point to a difference in crystal spacing between the two octohedral structure types present in the non-luminescent diamonds, which results in the laminar birefringence of such diamonds. The production of birefringence patterns by the intrusion of the octohedral type structure into diamonds having tetrahedral structure is confirmed by variations of luminescence, ultra-violet transparency and X-ray reflection, over the specimen. W. R. A.

535.515 : 549.211 : 535.371 *see Abstr.* 2578

535.653.84 2584

Symposium on the Ostwald colour system. *J. Opt. Soc. Amer.*, 34, *pp.* 353–399, *July*, 1944.—A symposium comprising the following papers: Foreword, Judd, D. B. [Abstr. 2585 (1944)]; Philosophy of the Ostwald colour system, Zeishold, H. [Abstr. 2586 (1944)]; Analysis of the Ostwald colour system, Foss, C. E., Nickerson, D., and Granville, W. C. [Abstr. 2587 (1944)]; Colorimetric specification of the Colour Harmony Manual from spectrophotometric measurements, Granville, W. C., and Jacobson, E. [Abstr. 2588 (1944)]; Application of the Ostwald colour system to the design of consumer goods, Birren, F. [Abstr. 2589 (1944)].

535.653.84 2585

Symposium on the Ostwald colour system. JUDD, D. B. *J. Opt. Soc. Amer.*, 34, *pp.* 353–354, *July*, 1944.—An introduction to the following four papers, pointing out that the Ostwald system of colour measurement has not been much used or studied outside Europe. The object of the papers is to give a factual and unprejudiced summary of the system. J. W. T. W.

535.653.84 2586

Philosophy of the Ostwald colour system. ZEISHOLD, H. *J. Opt. Soc. Amer.*, 34, *pp.* 355–360, *July*, 1944.—The science of colour must form a branch of psychology. Colour measurement must rely on the temporal duration, or memory, of every perception beyond the stimulus. The eye appraises contrasts rather than brightness (the Weber–Fechner law). The grey scale is therefore logarithmic. The hue scale is laid out in pigments so selected that each hue is halfway between its two neighbours. Any actual colour is defined in terms of the proportions of colour, white and black, which it contains. J. W. T. W.

535.653.84 2587

Analysis of the Ostwald colour system. FOSS, C. E., NICKERSON, D., AND GRANVILLE, W. C. *J. Opt. Soc. Amer.*, 34, *pp.* 361–381, *July*, 1944.—After a brief outline of the basis of the Ostwald system, extensive tables are given for (*a*) the tristimulus data, on the C.I.E. system, for 29 pairs of Ostwald semichromes under illuminant C, (*b*) the trichromatic coefficients and the reflectance for 28 Ostwald abridgement points for each of the same 29 pairs of semichromes, (*c*) colorimetric specifications for certain Ostwald samples, (*d*) certain properties of the abridgement points. The paper contains data necessary for a proper appraisement of the system and concludes with an extensive bibliography. J. W. T. W.

535.653.84 2588

Colorimetric specification of the Colour Harmony Manual from spectrophotometric measurements. GRANVILLE, W. C., AND JACOBSON, E. *J. Opt. Soc. Amer.*, 34, *pp.* 382–395, *July*, 1944.—Gives the tristimulus specification, the trichromatic coefficients, the dominant wavelength and the percentage excitation for each of the 680 colour samples in the Colour Harmony Manual which embodies the abridged Ostwald system. J. W. T. W.

535.653.84 2589

Application of the Ostwald colour system to the design of consumer goods. BIRREN, F. *J. Opt. Soc. Amer.*, 34, *pp.* 396–399, *July*, 1944.—Describes the advantages of Ostwald's outlook on colour to the designer of coloured products intended to attract the ordinary consumer. J. W. T. W.

535.733 2590

A mean scotopic visibility curve. STILES, W. S., AND SMITH, T. *Proc. Phys. Soc., Lond.*, 56, *pp.* 251–255, *July*, 1944.—Gives a mean visibility curve, and table of visibility (luminosity) factors for the dark-adapted eye, these values having been derived as a weighted mean from the results of five investigations. The change which takes place in the visibility curve as the brightness level increases is discussed in detail. J. W. T. W.

535.8 : 535.317 *see Abstr.* 2569

535.823.5 2591

Note on a thermostatically controlled microscope hot stage. PUDDINGTON, I. E. *Canad. J. Res. B*, 22, *p.* 125, *July*, 1944.—A microscope hot stage, capable of maintaining any desired temperature to within ± 0·1 deg. C. in the range from room temperature to 300°C. is described.

535.83 2592

Contact lenses. *Proc. Phys. Soc., Lond.*, 56, *pp.* 272–276, *July*, 1944.—A discussion held by the Optical Group.

536.2 : 523.877 2593

A problem in heat conduction in a sphere. SEN, N. R. *Bull. Calcutta Math. Soc.*, 35, *pp.* 131–134, *Dec.*, 1943.—A solid model of a heat-conducting sphere which has similar properties to stellar models with isothermal cores [Abstr. 991 (1943)] is discussed. The sphere has an isothermal core on the surface of which, in a thin shell, heat energy is generated. This heat flows through the body of the sphere outside the core. It is shown that, if the conductivity outside the core varies according to a simple law, the radius of the solid sphere has a min. value for varying relative size of the core. L. S. G.

536.245 2594

Incandescent patent thermobloc recuperator and heat exchanger. *Machinery, Lond., pp.* 102–104, *July* 27, 1944.—The recuperator consists of 2 banks of small-dia. tubes contained in a matrix of cast iron, one disposed vertically and the other horizontally interlaced between the vertical bank. This arrangement ensures efficient metal-to-metal contact between each tube and a large total area of heat-exchanging surface. Waste gases can be dealt with at temperatures $> 1\,000$°C. and high economy is claimed. M.-V.

536.423.4 : 533.7 *see Abstr.* 2562

536.461 : 535.338 *see Abstr.* 2572

536.631 : 549.211 : 535.33 *see Abstr.* 2571

536.7 : 541.123 : 539.219.1 2595

Thermodynamics and statistics of zeolitic solid solutions. BARRER, R. M. *Trans. Faraday Soc.*, 40, *pp.* 374–384, *Sept.*, 1944.—Occlusion isotherms are derived for zeolitic solid solutions in which the solute molecules possess various degrees of mobility within the crystal lattice. From the isotherms for these different models, std. free energies and entropies of occlusion are calculated and compared with these quantities derived from exp. data. This is done for various gas-zeolite systems and for H_2-Ti, Zr, Th, V and Pd systems. In all cases good agreement obtains between exp. and calculated entropies and free energies of occlusion when the solute molecules or atoms are treated as 3-dimensional oscillators. A thermodynamic criterion is given, showing when occlusion will occur continuously and when new phases will appear. The problem of the occlusion of long-chain solutes is considered and an isotherm derived. [See Abstr. 1387 (1944)].

536.7 : 548.0 2596

On the equation of state for solids. FÜRTH, R. *Proc. Roy. Soc. A*, 183, *pp.* 87–110, *Aug.*, 1944.—Bradburn [Abstr. 1460 (1943)] succeeded in deriving the equation of state for a solid cubic crystal, consisting of identical atoms, under the assumption that the mutual potential energy of a pair of atoms satisfies a law of the form $\phi = -ar^{-m} + br^{-n}$. A method is developed which makes it possible to determine m and n for a given element from measurements of the sublimation energy, the compressibility, the thermal expansion coeff., and the dependence of these quantities on pressure and temperature. The method is applied to a large number of elements; the compression and the thermal expansion of these substances agree with the measured values of these quantities up to very high pressure and up to near m.p. The question whether melting is caused by the mechanical instability of the lattice is also investigated, and a certain rule connecting the two phenomena is found which is closely related to Lindemann's law.

536.75 : 621.438 2597

A new polytropic chart for gas-turbine problems. WOOD, B. *Engineer, Lond.*, 178, *pp.* 80–82, *Aug.* 4, 1944.—[Abstr. 2158 B (1944)].

537.1 : 531.51 : 530.12 *see Abstr.* 2543

537.221 : 541.183.56 2598

The effect of adsorbed gases on contact electrification. DEBEAU, D. E. *Phys. Rev.*, 66, *pp.* 9–16, *July* 1 *and* 15, 1944.—The magnitude of the electrification produced on contact of quartz and of NaCl on Ni in atmospheres of air, O_2 and N_2 was measured. At least 2 layers of adsorbed gas play an important part in the phenomenon. In the pressure range from 760 to 30 mm. at least 1 layer of adsorbed gas is removed. In this pressure range, the surface covered with adsorbed gas makes the major contribution to the charge separation. At pressures below 0·1 mm., at least a second layer of adsorbed gas is removed. In this pressure range, the major contribution to the charge separation is made by the surface from which the second layer of gas has been removed. Water vapour and perhaps H_2 act as surface poisons.

537.226.8 2599

Experiments on electrets. GROSS, B. *Phys. Rev.*, 66, *pp.* 26–28, *July* 1 *and* 15, 1944.—An investigation of the currents and charges in electrets is described, preceded by a study of the influence of temperature on dielectric absorption, since the preparation of an electret usually involves a heat treatment. The basis of the discussion is the postulate of the existence of "homocharges" and "heterocharges," the former being the true (surface or space) charge, of the same sign as the polarizing electrodes, and the latter the true charges of the contrary sign. As regards an explanation of electret behaviour, it is considered that two mechanisms act simultaneously: (1) dielectric absorption, related to the movement of ions or the orientation of dipoles in the interior of the dielectric, originates heterocharges, (2) conduction in the interphase dielectric-electrode, which originates homocharges. A. M. T.

537.29 : 535.393 2600

The effect of intense electrostatic fields on the reflectivity of tungsten. STROBEL, C. K. *Bull. Univ. Pittsburgh*, 40, 3, *pp.* 294–302, *Jan.*, 1944.—[See Worthing, *Phys. Rev.*, 17, *pp.* 418–420, 1921]. The apparatus used consisted of a h.v. d.c. power supply, a vacuum test chamber, a high-vacuum pumping system and pyrometer measuring devices. Except for the pyrometer equipment, all was enclosed in wire screen cages. Full experimental details are supplied. Any change in the average brightness or reflectivity of the filament due to a change in voltage gradient was much less than the range of measured brightness or reflectivity in obtaining a set of pyrometer measurements. It seems possible that the electrostatic fields used in the vaporization and reflectivity studies have not been able to modify with certainty the surface structure of the metal. The indications are, however, that in extremely high vacua, certain changes in the vaporization rate and in the reflectivity of a metal should be produced by the application of sufficiently high electrostatic fields to the metal surface. [See also Abstr. 2045 (1944)].

H. H. HO.

537.29 : 535.434 *see Abstr.* 2582

537.312.5 : 549.211 : 535.215 *see Abstr.* 2565

537.521 2601

On a recent paper by Jaffé. PIERCE, J. R. *Phys. Rev.*, 66, *p.* 29, *July* 1 *and* 15, 1944.—[See Abstr. 1349 (1944)].

537.521 2602

On the currents carried by electrons of uniform initial velocity. JAFFÉ, G. *Phys. Rev.*, 66, *p.* 30, *July* 1 *and* 15, 1944.—[See Abstr. 1349 (1944)].

537.523.5 : 621.3.064.4 = 3 2603

On the theory of the electric arc and its extinction. MAYR, O. *ETZ* [*Elektrotechn. Z.*], 64, *pp.* 645–652, *Dec.* 16, 1943.—[Abstr. 2065 B (1944)].

537.525.8 2604

Long duration of the Balmer spectrum in excited hydrogen. RAYLEIGH, LORD. *Proc. Roy. Soc. A*, 183, *pp.* 26–32, *Aug.*, 1944.—The light of a capacitor discharge through H, emitting the Balmer series of lines, persists for much longer than current theories and experimental determinations of the time of relaxation of the H atom would lead one to anticipate. These determinations indicate a time of the order of 10^{-8} sec. for the intensity to diminish in the ratio $e:1$. It is shown that, if H made luminous by a powerful discharge is blown out of the electric field by its own expansion, the time in question is under some conditions 1 000 times more.

537 525 : 8 : 535.215 *see Abstr.* 2566

537.531 : 535.312 : 549.211 2605

Intensity of X-ray reflection of diamond. HARIHARAN, P. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 261–264, *May*, 1944.—With blue fluorescent diamonds, the intensity of X-ray reflection from the (III) planes increases with intensity of fluorescence, whereas with yellow-green fluorescent diamonds the reverse is shown. The order of intensity of X-ray reflection is: non-fluorescent > yellow > blue. This behaviour is correlated with views [Abstr. 2637 (1944)] on the crystal structure of real diamonds. W. R. A.

537.533.72 : 621.385.833 2606

A mechanical theory of electron-image formation. SCHLESINGER, K. *Proc. Inst. Radio Engrs, N.Y.*, 32, *pp.* 483–493, *Aug.*, 1944.—[Abstr. 2136 B (1944)].

537.534.9 : 539.185 *see Abstr.* 2617

537.591.15 2607

The production of cosmic-ray bursts by mesotrons. MOHR, C. B. O., AND STAFFORD, G. H. *Proc. Roy. Soc. A*, 183, *pp.* 54–64, *Aug.*, 1944.—The frequency of occurrence of cosmic-ray bursts under large thicknesses of iron and lead was investigated as a function of the thickness. A definite max. occurs in the curves for the smaller bursts, its prominence diminishing with bursts of increasing size. The dependence of the burst frequency on the size of the ionization chamber and the proximity of the shielding material to the chamber was also investigated. The results suggest the production of showers of mesotrons which spread out, and ultimately give rise to electron showers originating in widely separated areas in the material above, and round the sides of, the ionization chamber.

537.591.3 : 538.63 2608

Deflection of mesons in magnetized iron. RASETTI, F. *Phys. Rev.*, 66, *pp.* 1–5, *July* 1 *and* 15, 1944.—A beam of mesons was made to pass through 9 cm. of iron, and the resulting distribution of the beam was observed. In one arrangement, the deflection due to the field caused a fraction of the mesons to hit a counter placed out of line with the others. An increase of 60% in the number of coincidences was recorded when the iron was magnetized. In a second arrangement, all the counters were in line, and the deflection due to the field caused an 8% decrease in the number of coincidences. The observed effects agree with those calculated under the assumptions that the effective vector inside the ferromagnetic medium is the induction B, and that the number of low-energy mesons is correctly given by the range/momentum relation.

538.214 : 549.211 2609

Magnetic susceptibility of diamond. SIGAMONY, A. *Proc. Indian Acad. Sci. A*, 19, *pp.* 310–314, *May*, 1944.—The magnetic susceptibility, κ, of 40 Indian and S. African diamonds was determined by the Curie method. No systematic changes in κ with changes in colour, absorption, luminescence, and photoconductivity were observed. Values of κ ranged between $-0{\cdot}456$ and $-0{\cdot}411 \times 10^{-6}$. No change was observed when two highly fluorescent diamonds were exposed to intense radiation from a C arc, filtered free from infra-red. W. R. A.

538.214 : 549.214 2610

The magnetic susceptibility and anisotropy of carborundum. SIGAMONY, A. *Proc. Indian Acad. Sci. A*, 19, *pp.* 377–380, *June*, 1944.—Using the Curie method, the magnetic susceptibility, κ, and the anisotropy of SiC are investigated. Black crystals are diamagnetic but show irregular behaviour. A green, translucent, hexagonal plate of SiC behaved regularly and gave κ of $-12{\cdot}8 \times 10^{-6}$ and anisotropy of $0{\cdot}82 \times 10^{-6}$. W. R. A.

538.3 2611

Interaction between longitudinal current and flux in a nickel bar. PERKINS, H. A. *Phys. Rev.*, 66, *pp.* 21–25, *July* 1 *and* 15, 1944.—Reversing the current through the Ni alters the change of magnetism both when it is abruptly established and when it is abruptly stopped. In the 16 different cycles considered, a current flowing with the flux opposed magnetization, while a current flowing against the flux favoured magnetization. In addition to the shock effect equivalent to a mechanical jar, there is another effect which is reversed by reversing the direction of the current with ref. to the flux. This effect is some action between the current itself and the flux. [See Abstr. 826 (1942)].

538.63 : 537.591.3 *see Abstr.* 2608

538.711 2612

A magnetometer for the determination of the vertical component of the earth's magnetic field. TING, S. L. AND LIN, S. T. *Rev. Sci. Instrum.*, 15, *pp.* 171–177, *July*, 1944.—The magnetometer consists of a Helmholtz–Gaugain coil fixed on a horizontal divided circle for producing a uniform vertical magnetic field to balance Z, and a magnet-balance system for observing the effect of the fields. Z is determined in terms of the coil constants and the current through the coil. The error due to H and that due to the deviation of the c. of g. of the balance system from the rotating axis are eliminated, respectively, by taking the mean value of 2 observations with the axis of the balance set first in one direction and then turned into the opposite direction by rotating the whole instrument through 180° about a vertical axis, and by reversing

the polarity of the balance. The sensitivity is about ½ min. per γ.

539.155.2 : 546.21 2613

The separation of the oxygen isotopes by the distillation of water. THODE, H. G., SMITH, S. R., AND WALKLING, F. O. *Canad. J. Res. B*, 22, *pp.* 127–136, *July*, 1944.—Three 25 ft. columns packed with "Haydite" aggregate have been operated in cascade for 120 days to concentrate the oxygen isotopes by the distillation of water. In this time 23 g. of O^{18} in excess of normal were produced. This includes 150 ml. of water enriched 6·5-fold in O^{18} and 2·7-fold in O^{17}. The columns can be expanded to several ft. dia. for large-scale production of O^{18}. The v.p. of H_2O^{17} has been calculated and found equal to the algebraic or geometric mean of the v.p. of H_2O^{16} and H_2O^{18}.

539.155.2 : 546.815 = 3 2614

Artificial radioactive isotopes of lead and its neighbouring elements, using uranium and thorium lead. MAURER, W., AND RAMM, W. *Z. Phys.*, 119, 9–10, *pp.* 602–629, 1942.—A report on 3·3 h. Pb^{209}, 52 h. Pb^{203}, 68 min. $Pb^{204,205}$, a Waldmann and Collin's 1·6 min. Pb and a 10·25 min. Pb of Krishnan and Nahum, and their radiations. Results are given of artificial radioactive isotopes of 48 min. $Au^{200,202}$, 5·5 min. Hg^{205}, 13-day Tl^{202}, Bi^{209}. H. G. S.

539.16 : 546.291 : 550.422 2615

The distribution of helium and radioactivity in rocks. VI. The Ayer granite-migmatite at Chelmsford, Mass. KEEVIL, N. B., LARSEN, E. S., AND WANK, F. J. *Amer. J. Sci.*, 242, *pp.* 345–353, *July*, 1944.—Of twelve minerals studied in concentrates from the Chelmsford granite-migmatite, zircon, apatite, epidote and biotite, have more than 5 times the radioactivity of the parent rock; accessory minerals account for half the total radioactivity. A 150 000-fold contrast in He content was found between zircon and feldspar, yet the zircon containing 1·2 cm.³/g. appears to retain He, while more than 90% has escaped from feldspar and quartz. Excess He over that produced since carboniferous time was found in sphene. [See Abstr. 2212 (1943)].

539.17 : 778.31 2616

An investigation of the scattering of high-energy particles from the cyclotron by the photographic method. I. The experimental method. CHADWICK, J., MAY, A. N., PICKAVANCE, T. G., AND POWELL, C. F. *Proc. Roy. Soc. A*, 183, *pp.* 1–25, *Aug.*, 1944.—The advantages of a successful application of the photographic method of detecting nuclear particles to the study of the scattering of the high-energy beams of particles provided by the cyclotron are discussed. The design of a "camera" for this purpose is described. The theory of the method is discussed, and tests of the performance of the instrument are described which demonstrate its reliability. The angular resolving power of the method is of the order of ± 2°, and its ability to distinguish different groups of scattered and disintegration particles from range-distribution curves is superior to that hitherto achieved with counter and other methods of detection.

539.185 : 537.534.9 2617

Applications of the photographic method to problems in nuclear physics. II. The scattering of 8·8 and 13 eMV neutrons by protons. CHAMPION, F. C., AND POWELL, C. F. *Proc. Roy. Soc. A*, 183, *pp.* 64–87, *Aug.*, 1944.—[See Abstr. 2386 (1943)]. A method is described for determining the orientation of proton tracks in a photographic emulsion with an accuracy of ± 1°. The method was applied to the scattering of 8·8 and 13·0 eMV neutrons by protons. If $I(\phi)$ is the intensity per unit solid angle of the scattered neutrons in the centre-of-mass co-ordinate system of the colliding particles, the measurements give values of $I(\phi)$ in the range from $\phi = \pi$ to $\phi = \frac{1}{2}\pi$. When this range in the value of ϕ is divided into 5 equal intervals, the observed numbers of tracks in the different intervals are consistent with the scattering being isotropic in the centre-of-mass system to within the limits of the statistical error, for the 8·8 eMV group of neutrons. There is some evidence for a periodic fluctuation of high order in the angular distribution of the scattered intensity which remains to be confirmed. For the 13 eMV group the ratio of $I(\pi)/I(\frac{1}{2}\pi)$ is 0·67 ± 0·20. The neutrons were produced by bombarding B with 600 ekV deuterons and arise from the reaction $B^{11}(d, n)\ C^{12}$. There is evidence that the excited state of C^{12} at 4·5 eMV is complex.

539.217.5 : 679.52 2618

Apparatus for measuring gas transmission through sheets and films. TODD, H. R. *Paper Tr. J.*, 118, *TAPPI Sect.*, *pp.* 84–87, 1944.—[Abstr. 2193 B (1944)].

539.219.1 : 541.123 : 536.7 *see Abstr.* 2595

539.31 : 535.375 : 548.0 *see Abstr.* 2636

539.319 2619

Tessellated stresses. III. LÁSZLÓ, F. *J. Iron Steel Inst.*, 25 *pp.*, *Aug.*, 1944. *Advance copy.*—[See Abstr. 2015 (1943)]. The characteristic component system of tessellated stresses due to crystal anisotropy is analysed for metals with cubic, hexagonal or tetragonal lattices. The effect of tessellated stresses on thermal constants is studied. Irreversibility and hysteresis may be involved. The question of modification of tessellated stresses and their influence on density are discussed.

539.381 2620

Retraction of stressed rubber. MROWCA, B. A., DART, S. L., AND GUTH, E. *Phys. Rev.*, 66, *pp.* 30–32, *July* 1 *and* 15, 1944.—The retraction of stressed rubber was measured, using a revolving smoked drum and stylus to obtain elongation/time graphs. After about 450% initial stretch, the tip velocity was over 220 miles/hr. The speed of the tip was nearly const. except at the beginning. The middle lags behind the tip and has a slightly lower speed, and the rubber appears to contract from the free end, element by element. Different types of rubber were tested.

G. E. A.

539.381 2621

Photographic study of the retraction of stressed rubber. MROWCA, B. A., DART, S. L., AND GUTH, E. *Phys. Rev.*, 66, *p.* 32, *July* 1 *and* 15, 1944.—Photos taken by stroboscopic illumination show the wave pulse and its progress. The duration of retraction for about 100% initial elongation was from 5 to 20 msec. G. E. A.

539.381 2622

Theory of the retraction of stressed rubber. JAMES, H. M., AND GUTH, E. *Phys. Rev.*, 66, *p.* 33, *July* 1

and 15, 1944.—The theory of stress-wave propagation in elastic solids is applied to a test bar. A pulse of acceleration arises at the free end at the moment of release. Each portion of the bar is stationary until it is reached by the pulse, and as the pulse passes over it, the stress is completely relaxed. The wave pulse is reflected at the fixed end and causes buckling when transverse motion is not prevented. G. E. A.

539.501 2623

Derivation of Maxwellian relaxation times from tensile data. BLAIR, G. W. SCOTT. *Nature, Lond.*, 154, *p.* 213, *Aug.* 12, 1944.

539.501 2624

A study of the firmness of soft materials based on Nutting's equation. BLAIR, G. W. SCOTT, AND VEINOGLOU, B. C. *J. Sci. Instrum.*, 21, *pp.* 149–154, *Sept.*, 1944.—The Nutting power-law relating shear stress, strain and time, has been applied to data derived from the compression and extension of cylinders and strips of soft materials, each at a series of const. stress, due compensation being made for changes in the cross-section of the test-pieces. The majority of curves so obtained are linear, plotting log strain against log time, comparatively few materials giving curves showing marked deviations from linearity. A comparison of the 3 constants (two "quality" exponents and one "intensity" factor) is made for a variety of materials, including bitumens, rubbers (chiefly unvulcanized), clay and similar pastes, a variety of synthetic polymers, and cheese.

541.123 : 539.219.1 : 536.7 *see Abstr.* 2595

541.124 2625

The mechanism of some ionic reactions in aqueous solutions. WEISS, J. *J. Chem. Soc.*, *pp.* 309–311, *July*, 1944.—The mechanism of the reduction of Fe_2Cl_6 by stannous salts is discussed in detail and it is shown that $SnCl_4$ enters as the complex anion $(SnCl_4)^{2-}$ into a (2-stage) reaction of simple electron-transfer processes. Shaffer's general hypothesis for oxidation-reduction processes does not agree with the experimental facts. All these reactions can be easily interpreted on the basis of the "one-step" mechanism of oxidation-reduction processes, excluding reactions with (multivalent) ions of the same sign which are statistically disfavoured on account of Coulombic repulsion.

541.126 2626

The thermal decomposition of acetone. SMITH, J. R. E., AND HINSHELWOOD, C. N. *Proc. Roy. Soc. A*, 183, *pp.* 33–37, *Aug.*, 1944.—Inhibition by propylene shows that free radical chains occur in the thermal decomposition of acetone. Quantitative investigations permit of conclusions about the mechanism of the chain processes, which are compared and contrasted with those occurring in other decomposition reactions.

541.127 2627

The reaction of unsaturated halides with sodium vapour. EVANS, A. G., AND WALKER, H. *Trans. Faraday Soc.*, 40, *pp.* 384–397, *Sept.*, 1944.—The speeds of reactions with Na of several organic halides were measured. In many cases the reaction velocity is $>$ that to be expected from the corresponding C–Hlg bond strength. Some of these anomalies may be explained by the possibility of extra resonance forms in the transition state.

541.132.33 2628

On the direct measurement of glass electrode potentials with multiflex galvanometers. GERHARD, O. *Collegium*, 871, *pp.* 389–393, 1942. *Abstr. in Biol. Abstr.*, 18, *Abstr.* 10081, 1944.—Procedures for temp. compensation and general use with a high-resistance glass electrode are described. The instrument has low sensitivity to polarization and reads to 0·01 *p*H unit equivalent; it gives values at 20 sec. and 1 hr. in substantial agreement with H-electrode measurements of buffers 2·0–8·5 and beyond. C. J. G.

541.132.3 : 620.193.2 2629

Measurement of potential difference as a method for studying the action of water on lead pipes. ATKINS, W. R. G. *Nature, Lond.*, 154, *pp.* 211–212, *Aug.* 12, 1944.—[Abstr. 1920 B (1944)].

541.182.6.046.7 : 535.434 2630

Opacity changes during the coagulation of sols by electrolytes. PRASAD, M., GURUSWAMY, S., AND PADWAL, N. A. *Proc. Indian Acad. Sci. A*, 19, *pp.* 389–400, *June*, 1944.—Changes in opacity during the coagulation of $Th(OH)_4$, $Sn(OH)_4$ and $Zr(OH)_4$ sols have been investigated and the results enable comparison of the coagulating power of electrolytes to be made and show that Smoluchowski's equation is applicable only for rapid coagulation. Increased temp. and addition of MeOH or EtOH accelerate coagulation. W. R. A.

541.183.26 : 621.3.032.12 2631

On the behaviour of hydrogen inside a discharge tube. SINHA, S. P. *Bull. Patna Sci. Coll. Phil. Soc., No.* 14, *pp.* 137–139, *Jan.*, 1944.—[Abstr. 2063 B (1944)].

541.183.56 : 537.221 *see Abstr.* 2598

541.64 2632

The thermal polymerization and cyclic dimerization of isobutylene. MCKINLEY, J. B. *Bull. Univ. Pittsburgh*, 40, 3, *pp.* 185–194, *Jan.*, 1944.—The history of the study of thermal polymerization of isobutylene is reviewed. Cyclic dimerization is a characteristic reaction of isobutylene under all of the stated reaction conditions. In addition to the cyclic dimer, 2 : 4-dimethylpentane was isolated from the composite of 75–85°C.-boiling fractions. The cyclic dimer has been synthesized and found to be 1 : 1 : 3-trimethylcyclopentane. Nitrogen is an inert diluent with no effect on either the polymerization or cyclic dimerization. Probable mechanisms of cyclic dimerization are discussed. It is proposed that the cyclic dimer (1 : 1 : 3-trimethylcyclopentane) be called a cyclomer, rather than a polymer, of isobutylene, and that the process of its formation be called cyclomerization. H. H. HO

541.651 263

An electronic interpretation of substantivity based on dye structure. I. Azo dyes and their intermediates HODGSON, H. H., AND MARSDEN, E. *J. Soc. Dy Col., Bradford*, 60, *pp.* 210–214, *Aug.*, 1944.—The structure of a number of substantive azo dyes and intermediates is discussed from the standpoint o resonance theory and in support of the viewpoint tha 2 necessary conditions for substantivity are: (1) Co planarity of the aromatic nuclei; and (2) the presenc

of conjugate chains of sufficient length and facile resonance in order to provide the necessary electron-distribution for the polarities requisite for fixation of the molecule to the cellulosic material. Fulfilment of the above conditions is not sufficient to account for the substantivity of azo dyes, but a complete assessment is not attempted in this paper.

542.78 2634

Two methods of sealing-off large exhausting tubes. GEORGE, B. *J. Sci. Instrum.*, 21, *p.* 125, *July*, 1944.

544.65 : 535.71 *see Abstr.* 2577

545.81 2635

A sensitive portable self-contained phototube colorimeter for the field determination of cyanide in air. LESTER, D., AND ORDUNG, P. F. *J. Industr. Hyg. Toxicol.*, 26, *pp.* 197–200, *June*, 1944.—This instrument has the requisite sensitivity for the measurement of the change in light absorption of a methemoglobin solution in which a part of the methemoglobin is transferred to the cyanide derivative. The solution is introduced into a colorimeter test-tube and the cyanide-containing gas sample for analysis is drawn through the solution with an aspirating pump; the light absorption of the solution is read before and after the passage of the gas. The instrument is suitable for other field and lab. analyses using colorimetric methods. C. J. G.

546.21 : 539.155.2 *see Abstr.* 2613

546.291 : 550.422 : 539.16 *see Abstr.* 2615

546.815 : 539.155.2 = 3 *see Abstr.* 2614

548.0 : 536.7 *see Abstr.* 2596

548.0 : 539.31 : 535.375 2636

Calculation of the elastic constants of quartz at room temperature from the Raman-effect data. SAKSENA, B. D. *Proc. Indian Acad. Sci. A*, 19, *pp.* 357–369, *June*, 1944.—That the Si-O bonds in α-quartz are largely covalent is shown from the crystal structure and high frequency of vibration. Consequently it may be assumed that in a homogeneous strain the distance from the basis to basis is altered as if the basis was rigid and attached at one point in the continuum subjected to strain, and thus changes in bond distance and bond angles may be derived from the known crystal structure. The four force consts. for Si-O valency, O-O repulsion, and Si-O-Si and O-Si-O deformations are computed from Raman spectral data and from these the potential energy per unit vol. and, hence, elastic consts. can be calculated in agreement with observed values.

W. R. A.

548.1 : 548.24 : 549.211 2637

The crystal symmetry and structure of diamond. RAMAN, C. V. *Proc. Indian Acad. Sci. A*, 19, *pp.* 189–198, *May*, 1944.—The C atoms in diamond may be orientated in space in 4 different ways, pos. or neg. tetrahedral or octohedral forms. A fundamental vibration of the diamond lattice, $\nu = 1\,332\ \text{cm.}^{-1}$, should appear in both Raman and infra-red spectra if the crystals were tetrahedral, but only in the Raman spectrum if the crystals were octohedral. This behaviour has been observed in the common (tetrahedral) and rarer (octohedral) types [Abstr. 2291 (1934)]. The two tetrahedral types have identical properties and interpenetrate freely, but composition-planes result from the inter-twinning of the two octohedral forms, appearing as a lamellar structure parallel to the octohedral planes. Inter-twinning of octohedral and tetrahedral forms may also exist.

W. R. A.

548.1 : 549.211 2638

Experimental evidence for the existence of the four possible types of diamond. KRISHNAN, K. S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 298–303, *May*, 1944.—X-ray and spectroscopic studies of diamond provide experimental evidence for the existence of 4 diamond structure types. Co-existence of the 2 tetrahedral types is inferred from the increased intensity of X-ray reflection in such diamonds. The Bragg reflections of a diamond consisting of alternate layers of the 2 octohedral types, examined by the oscillating crystal method, exhibit a periodicity consistent with a difference of 0·05% in crystal spacing of the two types. The Raman displacement corresponding with the fundamental lattice vibration shows, for the octohedral type of diamond, a width equal in order of magnitude to the expected vibration difference of the 2 octohedral structures. W. R. A.

548.1 : 549.211 2639

The crystal forms of the Panna diamonds. RAMASESHAN, S. *Proc. Indian Acad. Sci. A*, 19, *pp.* 334–342, *May*, 1944.—The surfaces of the crystals are divided into 24 segments of sharply defined edges. In the best specimens these segments are triangles, the edges meeting at points and vertices in groups of 4 and 6. Measurements of curvature show that this is highly variable, even in the individual diamond. W. R. A.

548.24 : 549.211 : 548.1 *see Abstr.* 2637

548.32 2640

Roozeboom's solid-solution diagram, Type II. TIMMERMANS, J. *Nature, Lond.*, 154, *pp.* 23–24, *July* 1, 1944.

548.73 2641

Self-recovery in metals. MEGAW, H. D., LIPSON, H., AND STOKES, A. R. *Nature, Lond.*, 154, *pp.* 145–146, *July* 29, 1944.—Two theories have been put forward to account for the broadening of the X-ray reflections given by cold-worked metals: (1) The crystals may be broken down into small mosaic elements (fragmentation). (2) The crystals may be so distorted by the stresses (microstresses) present that the lattice parameter varies over a range of values. Recent work indicates (2) for the cases of copper, tungsten and α-brass. Although aluminium gives sharp lines when cold-worked and so exhibits self-recovery, there is recent evidence, verified in this paper, that broadening is not negligible, and it is now shown to be of a reasonable order of magnitude by means of photometer curves. Even for lead, which is also supposed to be "self-recovering" at room temperature, there is a broadening of the X-ray lines of about the right amount. Photographs taken at different times after filing show: (*a*) Iron and nickel to exhibit no appreciable change over several weeks. (*b*) Copper and silver to give striking changes of decreased broadening of the lines. (*c*) Aluminium and lead to afford some change, but in these cases the broadening is so near the limit of experimental error that the effect is not so clear as for silver and copper.

H. H. HO.

548.73 : 549.211 2642

X-ray topographs of diamond. RAMACHANDRAN, G. N. *Proc. Indian Acad. Sci. A*, 19, *pp.* 280–292, *May*, 1944.—White X-radiation, diverging from a pin-hole, is used. Lateral distortion of the particular Laue spot examined is eliminated by tilting either the photographic or the crystal plate. Topographs of 18 cleavage plates of diamond are given: (1) those exhibiting a uniform distribution of rel. weak reflection intensity over the whole area and characteristic of the blue fluorescent diamonds which are opaque in the ultra-violet and show no birefringence; (2) those having a strong reflection intensity and showing parallel lines running in different directions over the whole crystal area; ultra-violet transparent non-luminescent diamonds showing an intense birefringence are characteristic of this group; (3) an apparent co-existence of the first and second types, giving a uniform weak reflection overlaid by some regions of intense reflection. The latter appear as small areas of uniformly high intensity, as a few fine streaks running through the crystal, or as a combination of these two effects. This third type of diamond has properties intermediate between those of the first and second types. Correlation with luminescence, ultra-violet transparency, and birefringence patterns confirm the suggestion that the first type belongs to the tetrahedral structure, the second to the octohedral, and the third an interpenetration of the tetrahedral and octohedral types. W. R. A.

548.73 : 549.211 2643

X-ray topographs of diamond. RAMACHANDRAN, G. N. *Curr. Sci.*, 13, *pp.* 156–157, *June*, 1944.—[See Abstr. 2642 (1944)].

548.73 : 549.211 2644

X-ray reflection and the structure of diamond. RAMACHANDRAN, G. N. *Proc. Indian Acad. Sci. A*, 19, *pp.* 304–309, *May*, 1944.—Laue photographs, taken with the X-ray beam normal to the (111) planes, were investigated for 2 blue fluorescent diamonds with greatly different fluorescence intensities but similar in other respects. Microphotometric determination of the peak intensity of the various spots shows that, although the intensity is greater for the fluorescent diamond, the intensity ratio (v) differs for the various spots; $(v-1) \propto$ the product of the structure factor, the λ reflected, and a function of the angle of incidence. W. R. A.

549.211 : 53 2645

The physical, mechanical and chemical properties of the diamond. *Industr. Diamond Rev.*, 4, *pp.* 167–168 *and* 178–179, *Aug.*, 1944.

549.211 : 535.312 : 537.531 *see Abstr.* 2605

549.211 : 535.343.2-31 *see Abstr.* 2575

549.211 : 535.345-31 *see Abstr.* 2576

549.211 : 535.371 *see Abstr.* 2578, 2579

549.211 : 535.372 : 535.343.2 *see Abstr.* 2574

549.211 : 535.375.5 *see Abstr.* 2580

549.211 : 535.515 *see Abstr.* 2583

549.211 : 536.631 : 535.33 *see Abstr.* 2571

549.211 : 537.312.5 : 535.215 *see Abstr.* 2565

549.211 : 538.214 *see Abstr.* 2609

549.211 : 548.1 *see Abstr.* 2638, 2639

549.211 : 548.24 : 548.1 *see Abstr.* 2637

549.211 : 548.73 *see Abstr.* 2642–2644

549.214 : 538.214 *see Abstr.* 2610

550.341 2646

A note on the reading of seismograms. HORTON, C. W. *Geophysics*, 9, *pp.* 160–162, *April*, 1944.—A quick appraisal of the error in reading seismograms can be made by a statistical count of the occurrence of the third decimal. A method of interpretation is shown by analysis of five samples.

550.381 2647

List of geomagnetic observatories and thesaurus of values. V. FLEMING, J. A., AND SCOTT, W. E. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 109–118, *June*, 1944.

550.384 2648

Magnetic data, Cape Town and Hermanus Magnetic Observatories, 1940–1942. OGG, A. *Terr. Magn. Atmos. Elect.*, 49, *p.* 130, *June*, 1944.

550.385 2649

Principal magnetic storms. January to March, 1944. *Terr. Magn. Atmos. Elect.*, 49, *p.* 132, *June*, 1944.

550.385 : 523.745 2650

Magnetic storms and solar activity. NEWTON, H. W. *Observatory*, 65, *pp.* 177–178, *May*, 1944. A. HU.

550.389 2651

American magnetic character-figure, C_A, three-hour-range indices, K, and mean K-indices, K_A, for January to March, 1944. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 103–106, *June*, 1944.

550.389 2652

Five international quiet days and disturbed days for July to Dec., 1943. JOHNSTON, H. F. *Terr. Magn. Atmos. Elect.*, 49, *pp.* 130, *June*, 1944.

550.422 : 546.291 : 539.16 *see Abstr.* 2615

550.8(438) 2653

Geophysical exploration in Poland. WIR, S. M. *Geophysics*, 9, *pp.* 143–159, *April*, 1944.—Details additional to those given by Mitera are supplied regarding seismic prospecting in Poland 1934–7 and an account supplied of the work 1937–9. For the Carpathians and three foreland areas, the methods used and the problems encountered in seismic exploration are described. The seismic profile could be divided into 5 zones and a contour map of the marker bed obtained through most of the foreland area. In conjunction with the magnetic surveys, it formed the basis of the future geological and drilling programme. R. S. R.

550.831 2654

A proposed least-square method for the determination of the elevation factor. LEGGE, J. A., JR. *Geophysics*, 9, *pp.* 175–179, *April*, 1944.—The elevation factor is determined by fitting a polynomial to the gravity profile. The method is applicable to stations located along a straight line as well as those located at random over an area.

550.834.5 2655

The effect of charge size on reflection records. SHARPE, J. A. *Geophysics*, 9, *pp.* 131–142, *April*,

944.—Examples are presented showing the effect of harge size on: the ratio of the amplitude of reflected notion to that of surface waves; the ratio of the mplitude of reflected motion to that of random nterference; the frequency spectrum of reflected notion. The similarity between these observations nd the effects of changing depth of shooting are dis-ussed. The use of a larger or a smaller charge in particular circumstance may be the means of effect-ng a useful improvement in a record.

51.46.018.1 : 534.22 2656

A method of determining the time break on deep-sea eismic records from the water-sound arrivals. AGOCS, . B. *Geophysics*, 9, *pp.* 163–174, *April*, 1944.—A nethod is presented whereby, through the use of the irect water wave first arrival from a shot fired on the ocean bottom, and the first and second reflections of ound from the surface of the sea, the following data ay be obtained: (1) the ratio of the depth of the shot elow the surface of the sea to the lateral distance etween the shot and detector; (2) the lateral distance etween the shot and the detector at the bottom of ne sea; and finally, (3) the time of detonation or the me break in terms of the time scale of the detecting ecorder. The velocity of sound in sea water shows linear variation of the velocity with depth in definite ones with rather abrupt changes in slope of the elocity/depth curve from zone to zone. Curvature ue to refraction is found to be negligible in the calcu-tions made for true oceanic depths. Sample compu-tions are given.

51.5 2657

Progress in meteorology. BRUNT, D. *Quart. J. oy. Met. Soc.*, 70, *pp.* 1–11, *Jan.*, 1944.—A review f the present state of meteorology, dealing with nstruments and observations, the physics and ynamics of the atmosphere, the representation and atistical discussion of observations, and bio-eteorology. The future problems of meteorology re indicated, and the function of the university in aining and research is emphasized. A. HU.

51.501.42 : 551.508.71 2658

Mathematical relations for psychrometric data. INTER, C. C. *Bull. Amer. Met. Soc.*, 25, *pp.* 57–59, eb., 1944.—The const. in Maxwell's hygrometric quation is evaluated by using the experimental data f the humidity tables. Substituting the v.p. of water s a function of temperature in the equation, relations re derived for the rel. humidity, the dew point and he humidity at freezing temperatures. A. HU.

51.508.5 2659

The errors of cup anemometers in fluctuating winds. CRASE, F. J., AND SHEPPARD, P. A. *J. Sci. Instrum.*, 1, *pp.* 160–161, *Sept.*, 1944.—The over-estimation of ean wind speed in a variable wind is investigated or Sheppard and Meteorological Office patterns of he 3-cup anemometer. Comparison of Schrenk's heory with observation shows satisfactory agreement or hemispherical cups. Conical cups over-estimate ean wind speed to a much smaller extent than hemi-pherical cups and are to be preferred when unsteady inds are to be measured. For a given cup form, ver-estimation appears to be a min. for min. mass er unit area of cup; other parameters such as cup dia. nd arm length are of secondary importance.

551.508.71 : 551.501.42 *see Abstr.* 2658

551.508.94(09) : 551.594(09) 2660

A century of progress in atmospheric electricity at Kew Observatory. DRUMMOND, A. J. *Quart. J. Roy. Met. Soc.*, 70, *pp.* 49–60, *Jan.*, 1944.—The history is traced of measurements of atmospheric potential gradient, of conductivity, of the vertical air-earth current, of point-discharge current, of the charge on rain, and of the vertical distribution of electricity in thunderclouds. A. HU.

551.509 : 629.13 2661

Intercontinental flying and the pilot: the weather factor. BUCK, R. N. *Bull. Amer. Met. Soc.*, 25, *pp.* 152–155, *April*, 1944.—Meteorological factors influencing the cancellation, delay or completion of 7 flights are described. Advances which will improve the security of intercontinental flying include more accurate forecasting of the height of cloud ceiling, the devising of better de-icing equipment and wind-shield wipers, and the provision of radio directional aids combined with visual markers on airfield runways. The technique of avoiding or, if necessary, flying through air-mass and frontal thunderstorms is described. Radio free from static interference is needed in negotiating such weather. A. HU.

551.509.3 : 551.576.11 2662

Forecasting the formation of stratus in the Livermore Valley, Cal. DECKER, F. W. *Bull. Amer. Met. Soc.*, 25, *pp.* 54–57, *Feb.*, 1944.—Prediction of night stratus ceilings at Livermore during the Pacific anticyclone is shown to require knowledge of the sense of the component of the gradient wind normal to the coast, of the depth of the layer of marine air, and of the speed of inflow of the marine air. In the absence of complete fine-structure soundings over the ocean and the littoral, an empirical expedient is described which predicts the time of formation to within 1½ hr. A. HU.

551.509.312 2663

Pressure tendencies and stability changes in an isentropic surface. NEAMTAN, S. M. *Bull. Amer. Met. Soc.*, 25, *pp.* 127–136, *April*, 1944.—A formula is developed for use in computing the isentropic tendency, thus enabling the forecaster to estimate, from a current isentropic chart, the future distribution of the pressure field in an isentropic surface. The pressure tendency there is expressed in terms of the pressure tendency at the ground and the wind distribution in the layer of air betw. the ground and the chosen surface. The method of using radiosonde and pilot balloon data is described, and a modification of the formula is derived for use in forecasting stability changes in the free air. A. HU.

551.509.59 : 551.577.2 *see Abstr.* 2673

551.510.41 : 551.515 2664

The ozone content of surface air and its relation to some meteorological conditions. GLÜCKAUF, E. *Quart. J. Roy. Met. Soc.*, 70, *pp.* 13–21, *Jan.*, 1944.—The ozone content of the atmosphere at the surface is investigated by a self-recording chemical method during depressions. A drop is found up to 300 ml. in advance of a warm front, with high values after its passage. An occluded front of the warm-front type behaves as a front with a warm sector. A drop in

ozone content occurs after the passage of back-bent occlusions, persisting until the front has moved on up to 200 mi. The observed change is attributed to the increased stability of air at the upper warm-front inversion, which prevents the ozone constantly destroyed near the ground from being replenished by turbulence. Air masses contaminated by passage over industrial areas can be recognized after hundreds of miles by their lack of ozone if vertical interchange is prevented. A. HU.

551.515 : 551.510.41 *see Abstr.* 2664

551.515.81 2665

Note on equivalent-potential temperature. FORSYTHE, G. E. *Bull. Amer. Met. Soc.*, 25, *pp.* 149–151, *April*, 1944.—It is proved that, in a saturated mass of air, as the pressure decreases pseudo-adiabatically towards zero and the water drops out, the partial potential temperature of the mass approaches asymptotically the equivalent-potential temperature. A. HU.

551.515.83 : 551.575.1 2666

Cold-front passages during persistent fog over the Maritime Provinces in spring. LONGLEY, R. W. *Bull. Amer. Met. Soc.*, 25, *pp.* 143–148, *April*, 1944.—The author describes the effect of the rapid cooling that may occur in a current of warm air moving over the coastal waters off S.E. Canada. Weather observations from the observing stations of the Maritime Provinces during May 4–5, 1942, are used to illustrate the formation of fog in areas where the moving air has passed over the sea. The influx of cold air over a shallow layer of moist air may cause fog and stratus which make it difficult to locate the frontal passage from surface data. The time of passage is also difficult to establish, since dispersal of the surface layer may take place gradually by turbulence or by diurnal heating. A. HU.

551.521.1 : 632.187 *see Abstr.* 2685

551.521.63 : 551.590.21 2667

Ultra-violet and daylight rays. JONES, H. SPENCER. *Quart. J. Roy. Met. Soc.*, 70, *p.* 12, *Jan.*, 1944.—A criticism of Ashworth's conclusions [Abstr. 1472 (1944)]. The only variation definitely established in the observed ultra-violet radiation is the annual one due to the annual variation in atmospheric ozone. A. HU.

551.524 : 551.573 2668

A relationship between evaporation and temperature. PRESCOTT, J. A. *Trans. Roy. Soc. S. Aust.*, 67, *pp.* 1–6, *July*, 1943.—The relationship between mean monthly evaporation and mean monthly temperature for a range of Australian stations is best expressed in terms of a difference in phase which is a function of distance from the ocean. An equation is developed to express the relation between evaporation and phase-displaced temperature; this has been applied to some 30 sets of records and some correlations sought. The records are not sufficiently consistent for a general equation to be applied to all or part of S. Australia. C. J. G.

551.524.32 2669

Note on the relation between winter and summer temperatures at Oswego, N.Y. LOVERIDGE, E. F. *Bull. Amer. Met. Soc.*, 25, *pp.* 59–60, *Feb.*, 1944.—Mean temperatures during the 20 warmest and coldest winters since 1872 are compared with mean temperatures of the following summers. Abnormal winters, warm or cold, tend to be followed by abnormal summers with temperature departures of the same sign, the tendency increasing with the magnitude of the anomaly. The effect occurs, though to a less extent, in the temperature records of other cities in the N.E. United States. The result cannot be attributed to a secular trend in the temperatures, but may be due partially to the stabilizing effect of L. Ontario. A. HU.

551.525.2 : 551.588.2 2670

Thermal characteristics of a Hertfordshire frost-hollow. HAWKE, E. L. *Quart. J. Roy. Met. Soc.*, 70, *pp.* 23–48, *Jan.*, 1944.—Records of temperature over a 13 yr. period in a Hertfordshire valley are summarized, discussed and compared with other data. Only 2 of the 156 months passed without ground frost. Screen frosts occur even in July and Aug., and the monthly mean night min. temperature is at or below freezing for 0·6 of the year on the grass and 0·4 in the screen. Fourier analysis is applied to large ($>$ 50°F.) diurnal ranges, and thermograms are reproduced illustrating the greatest recorded daily variations, as well as the effects of katabatic winds and turbulence in the valley. A. HU.

551.554 2671

Some aspects of stability deduced from vertical wind shear. MARTIN. F. L. *Bull. Amer. Met. Soc.*, 25, *pp.* 79–87, *March*, 1944.—Stability relationships which are deducible from the variation of wind with height are discussed. A convenient construction is outlined from consideration of the vertical wind shear. A simple quantitative means of obtaining the horizontal distribution of the mean lapse rate is described, the stability changes considered being those due only to advection. Vector methods are used throughout, but owing to approximations made in expressing derivatives as finite differences, the numerical results are only applicable for 12 hr. forecasts. A. HU.

551.573 : 551.524 *see Abstr.* 2668

551.575.1 : 551.515.83 *see Abstr.* 2666

551.576.11 2672

Cellular clouds. CHIPLONKAR, M. W. *J. Univ. Bombay*, 12, *pp.* 9–28, *March*, 1944.—Photographs of natural stratiform clouds are compared with photographs of patterns produced in shallow fluids by thermal instability, with and without an applied shear. The cloud photographs show irregular polygonal cells, long rolls (with or without cells), and rows of cells. The degree of matching achieved suggests that qualitatively, and to some extent quantitatively also, the processes are identical. A. HU.

551.576.11 : 551.509.3 *see Abstr.* 2662

551.577.2 : 551.509.59 2673

An approach to quantitative forecasting of precipitation. SHOWALTER, A. K. *Bull. Amer. Met. Soc.*, 25, *pp.* 137–142, *April*, 1944.—A technique is outlined for forecasting duration and intensity of rainfall over an area $<$ 10 000 sq. miles. The process includes the organization of rainfall records for the area, the analysis of major storms over the region, and the correlation of previous rainfall with such factors as the surface dew point, the wind direction and velocity

nd the temperature gradient at 5 km. Recommendations are made for the preparation of prognostic harts, and a number of methods is outlined for computing the precipitation intensity, knowing the actual attern of wind flow and moisture distribution. 'resent technique does not adequately explain many utstanding rainstorms on the basis of frontal or air-ass activity. The problem is essentially one of dentifying zones of non-frontal convergence which an produce vertical motion well away from the fronts. A. HU.

551.577.59 2674

Smoke and rain. ASHWORTH, J. R. *Nature, ond.*, 154, *pp.* 213–214, *Aug.* 12, 1944.

551.588.2 : 551.525.2 *see Abstr.* 2670

551.590.21 : 551.521.63 *see Abstr.* 2667

551.593.63 2675

A halo phenomenon. CAVE, C. J. P. *Nature, ond.*, 154, *p.* 240, *Aug.* 19, 1944.

551.594(09) : 551.508.94(09) *see Abstr.* 2660

551.594.221 2676

Lightning. MEEK, J. M. *Electronic Engng*, 17, *p.* 96–100 *and* 123, *Aug.*, 1944.—Summarizes the lectrical characteristics of the thundercloud and eviews certain earlier theories. Photographic nethods available for studying the lightning discharge are considered, incl. the rotating camera. The levelopment of the lightning discharge with ref. o the stepped-leader and dart-leader strokes is explained and the relation of the field changes and tmospheric condition to the nature of the discharge s indicated. Methods of direct measurement of ightning currents by means of oscillographic recording nits, the klydonograph, magnetic links and the ulchronograph, are briefly mentioned. M.-V.

553.624 2677

On rounded pebbles. COOKE, H. C. *Amer. J. Sci.*, 242, *pp.* 364–366, *July*, 1944.

576.3 2678

A note on the mathematical biophysics of amoeboid movements. BUCHSBAUM, R., RASHEVSKY, N., AND STANTON, H. E. *Bull. Math. Biophys.*, 6, *pp.* 61–63, *June*, 1944.—Theoretical considerations lead to the expectation of quasiperiodic fluctuations of the ratio of the perimeter to the area of the optical cross-section of an amoeba, when plotted against time. Initial experiments appear to support the prediction. L. S. G.

576.34 2679

On a possible mechanism for biological periodicity. MORALES, M. F. *Bull. Math. Biophys.*, 6, *pp.* 65–70, *June*, 1944.—Osmotic coupling between solutes leads to differential equations of penetration having periodic solutions under certain conditions. Isotopes may satisfy these conditions exactly, and they have been shown experimentally to penetrate as predicted. The equations are similar to the interactive equations of Volterra and Lotka. L. S. G.

576.35 2680

On the theory of cell division from the point of view of the principle of maximum energy exchange. STANTON, H. E. *Bull. Math. Biophys.*, 6, *pp.* 71–76, *June*, 1944.—Rashevsky's differential equation for cellular elongation during division [Abstr. 501 (1944)] is reduced to the form studied by Landahl [Abstr. 2539 (1942)] and the universal constant τ which appears in the generalized Hamilton principle [Abstr. 2290 (1943)] is found to be of the order of 10^{-4} sec. L. S. G.

577.31 : 621.396.615.17 : 621.3.012.8 = 3 2681

Rhythmic biological activities occurring in trains or with periodic modulations. BETHE, A. *Pflüg. Arch. ges. Physiol.*, 246, *pp.* 485–519, 1943. *Abstr. in Biol. Abstr.*, 17, *Abstr.* 21208, 1943.—[Abstr. 2060 B (1944)].

591.18 2682

A note on neural nets. LANDAHL, H. D. *Bull. Math. Biophys.*, 6, *pp.* 77–78, *June*, 1944.—A neuron, N, is stimulated by a large group of neurons whose afferents are spread over some surface. To a part, A, of this area is applied suddenly a constant stimulation. Under certain conditions, the total stimulation, $\sigma(t)$, acting upon N at time t is shown to be independent of any movement of the stimulus. L. S. G.

591.18 2683

Equivalence of the theories of nervous excitation of Hill, Monnier and Rashevsky. HOUSEHOLDER, A. S. *Bull. Math. Biophys.*, 6, *pp.* 79–81, *June*, 1944.—New and direct proofs of the equivalence are obtained by introducing a new unit of time and a special unit for the measurement of the excitatory state. A normal form for Rashevsky's equations is obtained. L. S. G.

612.843.72 2684

Some notes on space perception. EMSLEY, H. H. *Proc. Phys. Soc., Lond.*, 56, *pp.* 293–304, *Sept.*, 1944.—Experiments are described illustrating the existence in many people of spatial distortions in binocular vision. These are largely ignored in the observation of everyday scenes when vision is aided by perspective and other factors, but may exercise important influence in special visual tasks. The thesis that these spatial distortions are due to the condition called aniseikonia is reviewed.

615.37 : 531.788 *see Abstr.* 2551

629.13 : 551.509 *see Abstr.* 2661

631.812 : 621.317.39 : 533.275 *see Abstr.* 2560

632.187 : 551.521.1 2685

Solar radiation and forest fuel moisture. BYRAM, G. M., AND JEMISON, G. M. *J. Agric. Res.*, 67, *pp.* 149–176, *Aug.* 15, 1943.—Forest fire-danger rating systems now in use in all forest regions of the U.S. are based chiefly on the measurement of wind and of fuel moisture; a study of the relation of solar radiation to fuel moisture was begun in 1938. The construction and operation of an artificial sun (twelve 150 W tungsten bulbs) is described; the uniformity of radiation at the fuel surface was verified with a photronic cell. Electric fans were used to draw air through the wind tunnel and over the fuel. Intensity of radiation was measured with an ice calorimeter. Formulae have been developed so that for any combination of air temperature, r.h. and wind velocity, equilibrium moisture content of forest litter can be derived for any season, slope and aspect. The influence of wind on fuel-drying is emphasized. In bright sunlight, wind maintains levels of fuel moisture higher than those in calm air. C. J. G.

632.94 2686

Further refinement of a technique for testing contact insecticides. McLeod, W. S. *Canad. J. Res. D*, 22, *pp.* 87–104, *Aug.*, 1944.—*Drosophila melanogaster* was sprayed with nicotine sulphate solution by both intermittent and continuous methods. There was no clearly demonstrated superiority of one method over the other. Increasing age of flies, increasing numbers of flies per cage, longer delays between filling of the cages and spraying, and increased proportions of males in the samples, raised observed mortalities. The type of cloth used to cover the cages must be standardized. Data on fly ages and numbers of flies per cage were put through the probit analysis of Bliss, which indicated that flies aged five days were most susceptible and fly numbers affected equally the mortalities due to all concentrations.

676.1 : 532.13 *see Abstr.* 2552

679.5 : 53 *see Abstr.* 2542

778.1 2687

Theory and practice of reflex copying. Murray, H. D. *Photogr. J.*, 84, *pp.* 250–253, *Aug.*, 1944.

778.1 2688

Reflex copying on plates. Stevens, G. W. W. *Photogr. J.*, 84, *pp.* 253–256, *Aug.*, 1944.

778.31 : 539.17 *see Abstr.* 2616

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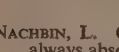
NEELAKANTAM, K., ROW, L. R., and VENKATESWARLU, V. Fluorescence reactions with boric acid and *o*-hydroxy-carbonyl compounds, and their application in analytical chemistry. II. Detection of  in aromatic compounds containing C, H and O only, 2009

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